COTTON

with which is combined

BOSTON JOURNAL OF COMMERCE AND TEXTILE INDUSTRIES and SOUTHERN MILLS.

Devoted to the Manufacture of Textiles.

Vol. 74, No. 3. ATLANTA, GA., JANUARY, 1910. 10 Cents a Copy.

RAYMOND D. BORDEN

FALL RIVER
MASSACHUSETTS

COTTON CLOTH AND YARNS

ACCOUNTS SOLICITED

ESTABLISHED 1905

BRAIDS TAPES BANDING ROPE

HIGH GRADE

SOUTHERN YARNS

IT PAYS TO USE NORTHROP LOOMS

NORTHROP LOOM BOBBINS

A B C D

E F G H

DRAPER COMPANY

HOPEDALE, MASS.

J. D. CLOUDMAN, Southern Agent, 40 South Forsyth Street, ATLANTA, GA.

COTTON

with which is combined

BOSTON JOURNAL OF COMMERCE AND TEXTILE INDUSTRIES and SOUTHERN MILLS.

Vol. 74 No. 3 ATLANTA, GEORGIA, JANUARY, 1910.

PUBLISHED MONTHLY BY

COTTON PUBLISHING COMPANY

ATLANTA, GEORGIA, U. S. A.

CHICAGO, BOSTON, PHILADELPHIA
NEW YORK, TORONTO, CANADA CLEVELAND, O.

Address European correspondence to
THE SECRETARY.
MANCHESTER COTTON ASSOCIATION,
22 St. Mary's Gate, MANCHESTER, ENG.

HENRY W. ATKINSON, EDITOR

CONTRIBUTORS

Joseph H. Barker
Alfred Burton
Charles E. Barnhardt
H. R. Carter
Stewart F. Carter
Park A. Dallis
Frederic Dannerth
Chas. Day
D. E. Earle
R. Livingston Fernbach
Jos. H. Hart
Sanderson W. Hayes
F. W. Horrocks
O. F. Ireland
Emil Kahn
Lamar Lyndon
C. L. de Muralt
Thomas Nelson
Will Nelson
Frank Nasmith
David Paterson
Henry Rowe
J. E. Sirrine
Stephen E. Smith
C. O. Terwilliger
John F. Timmermann
Ernest Tompkins
Samuel Ward
William Watson
F. R. Weller

SUBSCRIPTION RATES

DOMESTIC ..... FIFTY CENTS PER YEAR
CANADA ..... $1.00 PER YEAR
FOREIGN ..... $2.00 PER YEAR

C. T. FLOYD, Manager Subscription Department.

Entered at Atlanta Postoffice as Second-class Matter.

Contents.

Southern Prosperity and Industrial Development 99
Curtailment in Cotton Mills and Its Relation to the Cotton Producer 101
A Review of the Year in the Cotton Industry 103
The Cotton Mills of South Carolina 104
Power and Navigation at Columbus, Georgia 106
Importance of Railways in the Upbuilding of the Industries of the South 109
The Relation of Banks to Southern Industrial Development 111
Southern Prosperity and the Southern Farmer 112
The South as a Manufacturing Field 113
Annual Review of the Cotton Market 114
The South's Cotton Crop 116
Cotton Manufacturing in Texas 117
Recreation for Workers 118
Selling Yarns: A Discussion of Methods 121
The Conservation Movement in the South; What It Means to Southern Cotton Manufacturers 123
The Southern Forest Question 126
A Federal Cotton Experiment Station 128
Welfare Work: An Illustration 129
Humidity in Cotton Mills 131
The A. French Textile School of the Georgia School of Technology 133
Clemson Textile School 135
Textile Department, North Carolina A. and M. College 136
Texas Textile School 138
The Relation of the Press to Industrial Progress 139
The Progress of the World 139
An Improved Yarn Singeing Machine 141
An Automatic Tension Regulating Thread Guide for Winders 143
Types of Feeds on Loop Wheel Knitting Machines 144
Mercerization 145
Chemicals Used in the Textile Industry 146
Prize Contest Letters 147
Market Reviews 149
The Textile Mill Situation in the South and New England 153
New Machinery and Trade Notes 155
Mill News 164

SOUTHERN PROSPERITY AND INDUSTRIAL DEVELOPMENT.

Figures as a rule make dry reading, and it often happens that the true significance of a compilation of statistics is not thoroughly comprehended by the casual reader.

The story of Southern Prosperity and Industrial Development has been eloquently told by the bulging reports, and if one has failed to grasp the impressive picture portrayed by those infallible mediums, he has but to make an itinerary of the South to be satisfied that the cold figures are correct.

The cotton crop has always been the chief source of the South's wealth; with increased acreage, improved farming methods and better prices the lint and seed have come to yield to the Southern farmer a sum approximating $800,000,000 annually. This represents a per capita addition to the South's wealth of some $30 every twelve months. Furthermore the South, through its other farm products, its timber, coal, phosphate, sulphur, iron and petroleum, is amassing other millions.

While the wonderful extent of it may not as yet be fully realized, the fact of the South's prosperity boom is becoming widely known. No other subject receives so much discussion by the press of all sections. Special issues of many popular magazines and newspapers are devoted to it. As a result residents of the North and West, and the Southern people themselves, have within the past six or seven years learned more of the resources and possibilities of this section than a previous half century had unfolded.

So swiftly has commercial expansion developed that few people know that Galveston, New Orleans and Baltimore rank, respectively, second, third and fourth of American cities in the volume of their exports; that the value of Southern manufactured articles in the first five years after 1900 increased 31 per cent. as compared with 12 per cent. for the North; that bank deposits increased 192 per cent. for the South, against 78 per cent. for the North; that railroad mileage advanced 16 per cent. for the South and 5 per cent. for the North; that Southern people deposited twice as much money, per capita, in savings banks as did those of the North. When the statistics for the five years following 1905 will have been compiled, it is probable that comparative figures will be still more in favor of the Southern States.

With thorough knowledge of cotton growing, and with almost a monopoly of its production, the Southern citizen will continue to reap the agricultural benefits of his peculiarly favorable position. But, in addition, the widespread development of all Southern industries is of special interest owing to its magnitude and to the wealth accruing from the vast number of diversified enterprises.

Chief among these are the cotton mills, which in the last year consumed over 2,500,000 bales of cotton in the production of yarn and cloth valued at over $225,000,000. Cotton mills have literally taken possession of the South as the most

advantageous locality in the country for the textile industry.

In 1880 there were 161 cotton mills in the Southern States with 600,000 spindles. Taking the year 1880 as the beginning of a movement for Southern cotton mill expansion, the phenomenal success of the industry and its rapid growth are strikingly illustrated by the following table showing the number of spindles in the South and their consumption in bales at the end of September in each year to date:

SPINDLES IN SOUTHERN MILLS, AND THEIR CONSUMPTION OF COTTON.

	Spindles.	Bales Used.
1880	610,000	205,000
1881	680,000	238,000
1882	860,000	331,000
1883	1,100,000	334,000
1884	1,150,000	266,000
1885	1,200,000	340,000
1886	1,225,000	397,929
1887	1,177,901	443,373
1888	1,344,576	486,603
1889	1,554,000	526,856
1890	1,756,047	605,916
1891	1,938,524	681,471
1892	2,082,197	733,701
1893	2,167,242	723,329
1894	2,379,281	853,352
1895	2,770,284	915,810
1896	3,197,545	1,024,482
1897	3,574,754	1,227,939
1898	3,832,201	1,400,026
1899	4,298,188	1,477,775
1900	5,473,883	1,667,012
1901	6,179,421	1,942,881
1902	6,714,589	2,049,902
1903	7,387,358	2,007,509
1904	8,050,879	1,919,252
1905	9,205,949	2,103,505
1906	9,760,192	2,374,225
1907	10,598,095	2,439,108
1908	10,661,308	2,193,277
1909	11,255,787	2,559,873

The number of spinning mills in the South had increased from 161 in 1880 to 841 by the end of 1909, and the number of spindles to nearly 12,000,000. Of textile mills of all kinds, including knitting and woolen mills, the number now in the South is over one thousand.

This growth of the cotton manufacturing industry in the South is of most interest when compared with that of other sections. From a small beginning Southern spindles now consume between 50 and 60 per cent. of American-spun cotton. In 1907 there were delivered in the South 89 per cent. of the cotton looms, 71 per cent. of the cotton spindles and over 20 per cent. of all the knitting machines sold to American mills. For the year 1909 just closed statistics show about 44 new cotton mills built in the South against half that number in New England; the number of looms for the South slightly exceeded those sold in New England. New England only installed 600,000 spindles as against 900,000 in the Southern States.

The extreme activity in Southern mill building is at all times indicated by the columns of "new buildings" notes appearing constantly in the textile and daily press.

The South is the natural home for the cotton mill. In the first place the raw material may be obtained at its door, thus giving the advantage of price, quality, condition and delivery.

Then again the climatic conditions, with ten months of mild and warm weather, constitute a distinct advantage in economical operation.

Coal mines are located in various sections, and the mills have the advanttage of rates and distances over Eastern mills.

One of the most important factors in connection with the industry is the transportation facilities for delivering finished products. Railroads now cover all mill sections, and seaport towns offer many advantages. The completion of the Panama Canal will give the South an inestimable advantage in the fight for Oriental trade, by securing for it the lowest freight rates and fastest deliveries.

One of the most noteworthy advantages that the South offers in addition to those already mentioned, is the immense supply of water power available in practically all of the cotton manufacturing States.

The development of hydro-electric plants is proceeding rapidly, and hundreds of cotton mills are already securing hydro-electric power at a cost that fully justifies its adoption.

The result of this development in the South is, that the horse-power obtained from this source now totals 949,726. The horse-power developed, by states, is as follows:

Alabama	161,694
Arkansas	5,868
Florida	4,539
Georgia	166,587
Kentucky	14,156
Louisiana	1,184
Mississippi	7,922
Missouri	10,107
North Carolina	162,284
Oklahoma	2,994
South Carolina	207,242
Tennessee	95,060
Texas	9,966
Virginia	100,123
Total	949,726

It is hardly necessary to state that all of this power is not used by cotton mills, but the extent of its use is significant.

While it is true that the slogan, "Bring the mills to the cotton fields," has been followed by more mill building in the South than in any other section of the country, yet with all of the known advantages of this section, we can only predict that future expansion of the industry in the South will eclipse all previous records.

Exports of cotton for the year ending will be approximately $460,000,000 as compared with $366,000,000 for the year 1908 and $391,000,000 for the year 1907. If the experiments being made in the South with Indian cotton prove that we can use this staple, the imports of cotton will be greatly increased during the next six months, or until our new crop comes in. It is generally believed in New England that a very much larger acreage will be planted in the South this coming spring and that prices of cotton one year hence will be from 30 to 40 per cent. less than current quotations. The acreage planted last year was about 31,900,000 as compared with 32,444,000 in 1908, and 31,311,000 in 1907. The world's acreage for this past year is estimated at 59,918,000 with a yield of 17,838,000 bales. The Britsh India crop is about 4,000,000 bales or 40 per cent. of our crop.

Curtailment in Cotton Mills and Its Relation to the Cotton Producer.

(Contributed exclusively to COTTON.)

BY LEWIS W. PARKER, PRESIDENT AMERICAN COTTON MANUFACTURERS' ASSOCIATION.

Considerable criticism has been made of the course of the cotton mills of the United States, and particularly of the Southern mills, on account of the efforts made to encourage a curtailment of production during the fall and winter months. Claims have been made that the mills of the world have combined in a conspiracy against the cotton grower.

It is natural for the foreign mills and even for the mills of the Northern States of America to seek to secure their supply of cotton at the lowest possible price, and of course there is some depressing effect thereby upon the general price of the commodity. Likewise, each individual Southern mill must seek to secure its cotton at as low a price as possible in comparison with competitors, in order to be on an equality or at an advantage in contrast with those competitors; but at the same time there is full recognition on the part of the manufacturers of the South that their interests as a whole are allied with those of the cotton producer. And there is no desire on the part of the great majority of cotton manufacturers in the South to depress the general value of the commodity, though each must strive to secure his individual supply on the lowest possible basis. Indeed it is generally recognized that the Southern manufacturers are unconsciously almost always bullish in proclivities in their estimate of cotton, as they absorb the sentiment around them. Repeatedly is the statement made of them that they are the only manufacturers in the world who continually bull their own raw material.

LEWIS W. PARKER.

There is no justice, therefore, in the view that, because during the present season the cotton manufacturers of the world, including particularly those in the South, have been confronted with the most serious condition that possibly ever confronted them in trade, and have sought to meet an unparalleled condition by positive action on their part, this action is induced by any desire to go counter to the interests of the great mass of the people amongst whom these manufacturers live. Not since the period just after the Civil War has the price of the raw material, during that period when the mills purchased the greater part of their supply, been as high as it has been this season. Cotton goods, on the other hand, have not been abnormally high, or even above an average of prices when the raw material was much lower. Goods have so far failed, except in certain well-defined instances, to reach a parity with the raw material. The goods market, certainly until very recently, was still feeling the effect of the financial and industrial conditions of 1907 and 1908.

A very dear experience has taught each manufacturer that it is a very dangerous thing to manufacture goods out of a raw material above an average cost, unless those goods are sold and are to go at once into consumption. Likewise, experience has taught that there is no necessary relation between a high cost of raw material and the value of the product. The year which comes nearer to the conditions of this than any preceding year is that of the season of 1903 and 1904, otherwise known in cotton parlance as the "Sully Year," in which the raw material reached a figure in January and February, 1904, somewhat higher than the highest figure of the present season so far; yet during the spring and summer of 1904 the demand for goods was absolutely inactive and goods generally reached the lowest plane in the summer of that year that they have reached in a considerable number of years. The goods made in the spring and summer of 1904 were necessarily made from very high priced cotton and yet the manufacturer found himself unable to advance these goods to anything approaching a parity with cotton, and his losses during that spring and summer, as a general rule, were very heavy.

In the spring and summer of 1904 there was, as stated, no demand for cotton goods and many mills had to carry the production of that period for many months before sale, and to dispose of it finally, not on the basis of the raw material out of which they were made, but on the basis of the raw material of the succeeding cotton season, which, as it will be remembered, was very low, in comparison with the prices prevailing in the spring of 1904. The reason for this is evident; in cotton goods, unlike food-stuff, there is no constant demand. Whilst one has to eat each day regardless of the cost of food-stuff, one does not find it necessary to buy clothing each day or each month, regardless of the cost thereof. Almost every individual can go a number of months without purchasing additional cloth, if it seems to him that the cost of the cloth is too high and is above the basis on which he will purchase at a later date. The intermediate jobber who comes between the manufacturer and the consumer, is unwilling to assume the risk of purchasing goods in the spring and summer of one year, when he has reason to believe that goods in the succeeding fall will be considerably cheaper.

Cotton goods manufactured in the spring and summer do not in any case reach the consumer before the fall and winter, and in many classes of goods do not reach the

consumer until the succeeding spring. Consequently when the goods finally reach the consumer, if the cost of the raw material has been reduced by the time these goods do reach their destination, the consumer unconsciously contrasts the price of the goods with the present existing price of raw material, and if the goods then seem high in such contrast, there is a postponement of purchase. A recognition of this law of human nature makes the intermediate jobber pursue a hand-to-mouth policy in purchasing until the goods are reduced to the basis of the new cost of the raw material.

The present cost of the raw material is much in excess, as is well known, of an average cost. It is in excess also of a price at which one can reasonably expect it to be maintained. If there should be good seasons in the spring and summer of 1910, with the natural increase of acreage which will come from the present high price of cotton, it is not unreasonable to suppose that the South may in the cotton season of 1910 and 1911 produce in excess of 15,000,000 bales of cotton, which, so far as can be anticipated, would be ample to supply the world's needs. It is natural, therefore, to expect considerably lower prices to prevail in the fall of 1910 than now exist, or than are apt to prevail during the spring and summer of 1910.

The public expectation of this is shown in the prevailing prices on the cotton exchanges for the fall months of 1910, which are even now two cents below the prices for the spring months of the same year. It is not unreasonable to expect a repetition of the conditions of the summer and fall of 1903, when the price of cotton in August and September on the exchanges was from three to four cents a pound in excess of the prices prevailing for the fall months. With the natural anticipation of these conditions, there is great danger that the demand for cotton goods in the spring and summer of 1910 will be very much lessened, and will not be equal to the supply of goods offering, unless the goods are reduced to a much lower basis than is possible without great loss to the manufacturers.

The only way therefore of relieving this possibility, and indeed this probability, is by a concert of action on the part of the manufacturers looking to a curtailment of product in the winter and spring of the present year, in the hope thereby of making some reasonable scarcity of goods in the spring, so that there shall be no accumulation of product. Should there be any considerable accumulation of product unsold in the spring of 1910, the results to the manufacturers during the summer will in all probability be most serious. Curtailment, therefore, in the winter and spring of the present season is the only way to prevent this accumulation, and a curtailment during the spring and winter will be very much more effective upon trade than any possible curtailment in the summer. It is in this view that many manufacturers have urged concert of action on the part of the mills looking to a curtailment during the winter and spring of this season, and it is hoped that thereby goods can be brought to a reasonable parity with the raw material.

At the present time, except in a very few instances, this parity does not exist, and many classes of goods can only be manufactured at a positive loss with the present price of the raw cotton. Indeed there are some classes of cotton goods in which, after the manufacture of the cloth, one is not able to secure for the manufactured goods the price of the raw material itself going into this product, causing thereby a loss to the mill of all the cost of manufacture. It would seem therefore that curtailment is the only reasonable business solution of the dangers confronting the manufacturers.

If the government estimate of the crop is correct, and if the crop is not to exceed ten to ten and one-half million bales, then the manufacturers of the world must furthermore recognize that there will not be a sufficient amount of raw material to supply all the spindles of the world using American cotton, if run to their full capacity on the class of product on which they are ordinarily accustomed to run. In that light also, curtailment becomes absolutely necessary, and such curtailment must either occur throughout the whole season, when it will have some reasonable effect upon the prices of manufactured product, or it must occur at the close of the season, during the late summer months when it would have little effect on the price of the manufactured product. Common prudence, as well as good business considerations, require therefore that the effort should be made to make the curtailment throughout the whole season, rather than to face its necessity in the summer months.

Whilst there is no necessary relation between the price of the raw material and the price of the manufactured product, it is a mistake to suppose that the grower of cotton is not in a series of years affected by the failure of the manufactured product to respond to a higher level in the price of raw material. This is distinctly shown by the conditions of the fall of 1904, when the raw material fell to a very low basis. Indeed, one conversant with the conditions of a series of years can see confidently that the grower of raw material is as much interested on an average in the success of the manufacturer of his material as is the manufacturerer himself.

It is unjust therefore for the public to think that the effort of the manufacturers to secure a general curtaliment in product, with a view of affecting the prices of the product and bringing the same to a parity with raw material, is in any wise a movement unjust to the producer, or directed in any sense at him. The object, if fulfilled, will in the end be to the interest of the producer, as unquestionably it is to the manufacturer. There must be a reasonable parity between raw material and manufactured product if manufacturers are to succeed and survive.

COMPARATIVE EFFICIENCY OF OLD AND NEW PLANT.

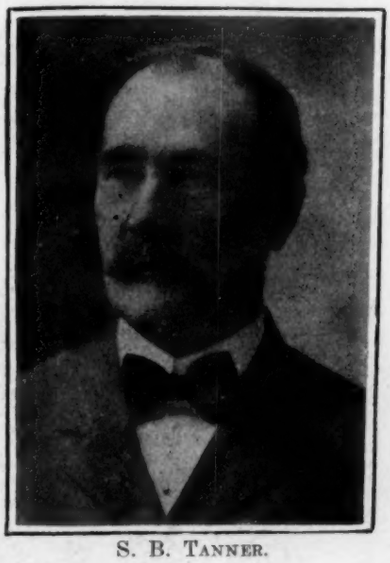
An interesting opportunity for comparison of the efficiency of operation of old and new mills of substantially the same size and capacity was recently presented in connection with the practice to Charles T. Main, mill engineer and architect, of Boston. Both plants were devoted to the manufacture of textiles. One was built many years ago in the style of that day, with comparatively little regard for light and ventilation, and with the then prevailing arrangement of machinery, shafting, etc. In the new mill modern improvements were introduced in the way of arrangement of machinery, transmission of power, lighting, ventilation, etc. Although the equipment in the latter was almost identical in assumed output with that in the former, it was found, much to the surprise of the owners who had merely looked upon the new plant as a duplicate of the old, that it was capable of turning out the standard product with a saving of nearly 15 per cent. in operating expense.

A Review of the Year in the Cotton Industry.

(*Contributed exclusively to* COTTON).

BY S. B. TANNER, PRESIDENT HENRIETTA MILLS, CAROLEEN, N. C.

The past year has been one of hard trials for the cotton mills generally, with the exception of mills making specialties, and possibly some mills on the finer grades of goods. The effects of the panic, coupled with the tariff agitation, lingered throughout the greater part of the year. As a consequence consumers of goods were largely unemployed and not in position to supply themselves with anything but urgent necessities, which caused dull trade and quite an accumulation of goods in the hands of merchants and manufacturers. Furthermore, the cotton manufacturers had not curtailed production in proportion to the forced restriction in consumption.



S. B. TANNER.

Many efforts were made among the mills to bring about a general curtailment of production, and the general impression was that it was really in effect on an extensive scale, both in this country and in Europe. But when textile interests became aware of the fact that the crop of 13,800,000 bales of cotton—the largest yield in the history of the country in addition to a large surplus carried over from the previous year—had been consumed, and that this country and Europe were early and eager buyers of the new crop at 12½ to 15 cents during the months of the heaviest receipts of cotton, the mills began to ask each other who it was that did the curtailing. It seems that each man expected all the others to reduce their output and that he would run his mill full time, and then enter the cotton market and stock up early in the season when the market is usually depressed by heavy receipts. But it became very evident even before the new season opened that the crop would not be a large one, and instead of being the only man who had been running full time, and the only man on the market for cheap cotton, he found the whole textile coterie by his side bidding the market up, and the speculators assisting him freely.

The market for cotton goods opened up fairly well during the late summer and early fall months, but when the trade found that there had really been very little curtailment of production, it took advantage of the situation and purchased only in a small way until distressed goods and yarns came on the market from which the demand was supplied below prices at which mills could produce them from the high priced cotton. Since that time there has been a steady hand-to-mouth buying in some lines at prices based on the higher cost of cotton, but the buying has not been extensive for the reason that some people still expect a large crop of cotton and look for lower prices. The general belief, however, is that the next rush will be on the part of the trade to obtain supplies, as consumption has been very large and is increasing daily, and if the cotton crop is as short as some conservative estimators predict, the conditions will be changed and the question will be who did not curtail instead of who did, before we reach another cotton crop, and the scramble next fall will be greater than the last.

All farm products have been on a 15-cent cotton basis for two years, and with the increased consumption 15 cents will not seem high in comparison or otherwise, unless a crop of a round fifteen million bales, American cotton, can be assured. The average price of corn for the past eighteen months has risen from 50 cents to $1.00 per bushel in this section; wheat from 75 cents to $1.25 and $1.50; eggs from 10 cents to 20 and 25 cents; and all other farm products in about the same proportion, the prices being paid without hesitation.

It is absurd to say that goods made of 15-cent cotton will not sell freely. The world took all the goods the mills could produce over forty years ago when cotton was around 18 to 30 cents per pound, and at a time when this country was almost bankrupt and the purchasing power of the people was very small in comparison with the present. The only thing necessary in establishing high a level of prices for cotton and cotton goods is confidence in the stability of the markets. Some maintain that even if this year's crop is small, the price of the staple will decrease when a large acreage is planted next spring; but there are two sides to this question. We had a large planting last spring, following the largest crop on record, and conditions were such that the price gradually advanced to 15 cents. Suppose similar conditions prevail next spring, following a very short crop—there would be no question about values—it would be only a matter of getting a supply of goods if possible.

Cotton at 15 cents is lower in proportion than any other commodity, and the prices of goods which have been made on this basis are not high. When the trade becomes accustomed to the higher level of prices there will be as many goods sold as at the lower prices, and the Southern planters will only be on a parity with his neighbor planters in other sections of the country, but if prices are fairly uniform, manufacturers everywhere will make as good profits as they would on lower priced material. It only requires a casual view of the Southern farmers' homes to convince any one that he has not been receiving sufficient compensation for his labor expended in producing cotton for clothing the world, and that higher prices for cotton and cotton products are fully justified. Immense areas are being planted in wheat and oats throughout the South this season, and there is no assurance that the cotton acreage will be increased, as the prices at which grain and meat have been selling are more profitable than the present price of cotton.

The Cotton Mills of South Carolina.

(Contributed exclusively to COTTON.)

BY THOMAS F. PARKER, PRESIDENT MONAGHAN MILLS, GREENVILLE, S. C.

Cotton manufacturing was carried on in a limited way in South Carolina previous to the Revolution, but its growth was practically negligible owing to the prevalence of slavery which promoted agriculture to the neglect of practically all other industrial pursuits. In order to properly appreciate the position of the cotton mill of to-day as a social and economical factor, it is necessary to properly understand the conditions, growth and surroundings, and state of the industry in its early history.

It is hard for one who has not suffered in the South, to realize the depths of poverty and ignorance to which the masses of South Carolina were reduced at the close of the "Reconstruction period;" this proletariat constitutes the mill operating force of the State. Prior to the Civil War, in 1860, South Carolina ranked third among the States in per capita wealth, the expenditure for education in that year approximating $700,000. After sixteen years of strife and turmoil when this State had brought to a successful close the desperate struggle against the so-called "Reconstruction Forces," which struggle was for the preservation of civilization itself, the value of the property had depreciated 75 per cent. and the State had lost a large portion of her best citizens and nearly all means of education.

THOMAS F. PARKER.

In 1876, with peaceful political conditions prevailing, but with resources and capital almost exhausted, and without trained manufacturers and operatives, the South Carolina survivors being urged forward by necessity, resumed manufacturing. This movement continued to expand, and in 1880 there were about 18 mills with less than 2,000 looms. This, however, was only the beginning of the industry in the State, which served to attract capital from the New England cotton machinery manufacturers, New York sales agents, and other outside capital that gave the movement tremendous impetus. From a very insignificant beginning in cotton manufacturing, South Carolina has risen by leaps and bounds until now the State ranks second in the United States with 150 mills costing over $100,000,000 and containing 93,000,000 looms; citizens of the State own 75 per cent. of the capital invested in the mills, and the mill village population is in excess of 150,000 persons.

During the pioneer days of the industry in 1876 there were about 1,000 cotton mill operatives, with a combined yearly wage of about $250,000. At the present time there are nearly 50,000 operatives employed, with a total yearly wage approximating $12,000,000. In 1876 the average daily wage of the operative for thirteen hours' work was less than 60 cents; this has been gradually increased to an average daily wage of $1.10 for ten hours. During this period about one-fifth of the white population have left the farms to take up work in the mills, which also has had the effect of changing them from producers of farm products to consumers.

By 1907 the yearly purchase of cotton by mills in the State exceeded $34,000,000, being equivalent to 80 per cent. of the State's cotton crop. This tremendous consumption of cotton within the borders of the State was a very important factor in enlarging the cotton crop from 200,000 bales in 1870 to over 1,290,000 in 1908. During this same period the corn and rice crops were doubled in size, and the hay crop was increased twenty times, while the tobacco crop increased 570 times.

One of the effects of the growth of the cotton industry was to build up mill villages adjacent to the best towns of the State. These mill villages contained new houses, with from four to six rooms, for the operatives. When it is realized that this population has been drawn in a large measure from remote and scattered homes, inaccessible and apart from any civilizing influences, it will be understood how these people have been profoundly influenced for good—economically, religiously, and socially—by their new environments.

The growth of the textile industry in the State has necessarily been of immense benefit to the railroads, banking institutions and other branches of endeavor, all of which have been the means of raising the general labor wage in South Carolina, including that on the farm, to approximately that of the most prosperous sections of the country.

A comparison of the mill operatives' homes with some of the typical places from which these people came, including the barren sand hills and isolated mountain homes, would serve to give a great many people an entirely different understanding of the cotton mill's philanthropic influence upon these people. As a rule a family removing from one of these isolated farms will bring all of its belongings and the members of the household in one wagon to the mill, and as is very often the case they have to obtain a cash advance with which to purchase food upon their arrival, owing to their absolute poverty. The new life at the mill and in the village, with regular wages, intelligent interests, and contact with civilization, is a wonderful uplift for these people.

This new industry was not created at the expense of any values of any other industry, but it is an embodied spirit of prosperity with benefits for all. Its achievements are those of a business effort, as manufacturing in South

Carolina has no claim to other purpose. However, judged by the importance of its net results that are of benefit to the State, it will bear a favorable comparison with the State's educational or philanthropic movements in their own field during the same period.

The mills of South Carolina as a whole are more modern than the New England mills; they represent the best examples of modern mill construction, and have the highest type of equipment and sanitary arrangement, including abundant lighting, high ceilings, good ventilation, heating, etc. Recognition of these excellent mill structures is given by the Massachusetts Bureau of Statistics of Labor, when in a publication in 1905 it states: "A large proportion of the mills (Southern) built and started between 1890 and 1900 are thoroughly up-to-date in all respects; in fact some improvements in mill construction are to be found in that section which are not yet introduced in the manufacturing regions of the North."

Night labor in South Carolina cotton mills can be said to have nearly ceased, and there are only four of the smaller mills that continue this practice. Already the percentage of female operatives in South Carolina is less than in Massachusetts; the United States Census 1900 gave South Carolina a percentage of 37 for female operatives, and the Massachusetts State Bureau gave in 1906 a percentage of 43 in that State. It is difficult to compare the mill wages of Massachusetts and South Carolina, owing to the different systems of remuneration, but it can be said that the wages in Massachusetts are about 10 per cent. to 15 per cent. higher, but at the same time the living expenses there are fully as much higher, than in South Carolina.

A careful record kept for over a year in a mill village has shown that there were no cases of nervous, pulmonary, or other diseases caused by dust or cotton particles peculiar to cotton manufacturing in the South. As a general rule when the operatives have not come to the mills bringing diseases with them, they are healthy and their physical condition is improved very noticeably.

Dr. Chas. W. Stiles, Chief of the Division of Zoology of the Public Health and Marine Hospital Service, Washington, D. C., in speaking of the health of the cotton mill operatives said: "I said that I looked upon the cotton mills as the greatest and almost the only real friends that the poor whites of the South have and that I could not concur in the popular condemnation to which the cotton mills are constantly subjected. I took the position that there is another side to the child-labor question, a side not generally understood; that I considered these children better off in the cotton mills than in the soil-polluted, disease-breeding, one-horse, privyless farms. This does not mean that I am an exponent of child-labor as an abstract proposition, but rather that I look upon child-labor in the South as the lesser of the two evils, and given the present medieval conditions existing on the one-horse tenant farms, I view child-labor as an actual blessing when compared with the child misery which is found more particularly in the sand lands and in the Appalachian region."

Legislation in South Carolina affecting mills has been wise and moderate, and has refrained from enacting sumptuary or rashly experimental laws; and substantial advance has been made along progressive and much needed lines. Apart from all other considerations, laws which are much in advance of a strong public opinion are of little use, and experience and educational forces must precede wise and lasting legislation. Legislative amendments have reduced mill hours to sixty hours per week, and child labor under twelve years of age is forbidden; a department of Commerce and Labor has been established with regular factory inspection and the collection of mill statistics; and a State Board of Health is actively interested in the study and improvement of mill conditions. One of the most important considerations in connection with cotton manufacturing in its relation to the State, is the mill's influence for good and evil upon the white children under its influence which number one fifth in the State. The importance lies in the fact that the State will have to depend upon these people as men and women of the future, and its welfare makes imperative a thorough and wise handling of this young generation. It is a noticeable fact that South Carolina mills are a most important factor in the rapid and complex State-wide evolution now taking place, which constantly makes new requirements of mill managements.

Aside from the many benefits that a child derives when he is brought into close touch with the best civilization of the State, as compared to the hopeless isolation and poverty with which he was previously surrounded, let us consider what educational influences are most needed for a child in a mill village. Considering his antecedents and environments, could he be given other than an industrial education? Should this education not be accompanied by discipline, stimulating influences, and immediate and adequate reward of effort in money? This is what the mill furnishes; a combination of an ordinary day school for the child and night classes for adults, with the industrial training alternating with the other, and making a practical self supporting system of much merit.

The child naturally acquires the habit of industry and develops a desire for the good things of life which he sees others securing by their own exertions. In other words he is in a general atmosphere of work with economic forces surrounding his daily duties. It is a fact that many mill operatives of South Carolina with unpromising antecedents are now earning a wage equal to that of store clerks and school teachers who have had many advantages in early life. The fact is that many operatives will gradually outgrow the work in the mills and will seek employment in other lines that can offer a higher grade of work with its consequent increase in wage. Indications are not lacking that in spite of the latest machinery and increased efficiency, the demand for cotton mill labor may in the not far distant future outstrip the supply, and that South Carolina with its great diversity of natural resources and its hostility to inferior foreign immigrants, may develop high priced cotton mill labor. Conditions at present are already such that South Carolina's dependence for future extensive expansion in cotton manufacturing lies in advanced business methods and a constant progress in the fineness and quality of the goods manufactured.

TEXTILE CLUB AT COLUMBIA, S. C.

As a result of a suggestion made by President Lewis W. Parker, of the Olympia, Granby and Richland Mills, in the course of an address at the mill village Y. M. C. A. there has been organized a textile club with these officers: W. P. Hamrick, president; W. A. Black, vice-president; E. P. T. Foster, secretary and treasurer, and a board of governors, one man from each mill. The regular meetings are on Thursdays.

Power and Navigation at Columbus, Georgia.

(Contributed exclusively to COTTON.*)*

BY FREDERICK B. GORDON, PRESIDENT COLUMBUS MFG. CO., COLUMBUS, GA.

When a certain young student once scanned a map of the United States, he turned with a questioning look to his teacher and asked, "Why is it that nearly all the principal rivers run by the large cities?" The question was, of course, not stated correctly, and when reversed would serve to emphasize the fact that, with a few exceptions, nearly all of the large and growing cities in this country are located on navigable water.

And so when in 1827 the Georgia legislature took the first step towards the establishment of the city of Columbus by passing "An act to lay out a trading town, and to dispose of all the land reserved for the use of the State near the Coweta Falls, on the Chattahoochee River, and to name the same" it showed that its members were far-seeing enough to recognize the future advantages of such a location. Under this act five commissioners were appointed by the governor to select the most eligible site, which they immediately did, and named the new town Columbus. One year later, in December, 1828, the town of Columbus was duly incorporated. So we find ourselves now at the ripe old age of fourscore. These five commissioners probably did not dream in that day of what would be later developed by hydro-electric power, but they showed wonderfully good judgment by selecting their town site immediately at the foot of the falls and at the head of navigation. They may not have known what kind of a harness was to be used to control the power hidden in the dashing rapids of the river, but they doubtless did know that water running down hill was a cheap power and one that would not always be allowed to run to waste.

FREDERICK B. GORDON.

Power and navigation! What two words in the vocabulary of commerce have a more magnetic sound, or stand for any more important essentials to commercial progress than do these? The multiplication of the power of the horse at the lowest possible cost, irrespective of the source from which it is derived, has been the study of the world's engineers since the time of the earliest recorded efforts to make machinery do the work of the hands. And of equal importance has been the question of navigation; how to most quickly and cheaply transport from one place to another the articles of commerce. Early in her history the city of Columbus became intensely interested in both of these great commercial possibilities. From "Martin's History of Columbus" I find that pole boats were first used between Columbus and Apalachicola. The first steamboat that came to Columbus landed in March, 1828. After she had been here a week or ten days, making some repairs the captain arranged for a pleasure excursion down the river to Woolfolk's Mound, the next Sunday. Nearly everybody went and a good number had to walk back to town on account, as the captain alleged, of not being able to raise sufficient steam for the boat to make headway against the river current.

Thus for eighty years the Chattahoochee River has served as a means of transportation for the merchants and manufacturers of Columbus. For the first fifty years of that period no record can be found of any municipal, state or national appropriations of importance, which verifies the statement made in the chief engineer's report to the United States government that "originally boats were always able to reach Columbus." During the last thirty years the Columbus Board of Trade has been an active worker for this city in presenting at various times before the rivers and harbor committee of Congress the need of government aid in keeping open the channel of this important artery of our commercial body. Other cities interested have been equally vigilant, and the importance of this part of the government work is well understood and fully appreciated by that important committee, which has in charge the waterways of the country. The only government appropriation prior to the war was $2,000, made in 1835. Beginning in 1874 small appropriations were made up to 1902, when $100,000 was allowed and this was the largest appropriation except that of 1907 (the last made), of $150,000. The total amount expended up to and including 1907 is $724,930.78.

In connection with the gulf canal project, and to help promote the project to successful construction, the latest reliable data as to traffic on the Chattahoochee and the commerce of the city of Columbus is one of the utmost importance, for if we are not growing commercially and if Columbus has not the commercial standing and the commercial future that will appeal to the good business judgment of the members of the rivers and harbors committee, she need neither expect increased appropriations nor should she deserve them.

Now as to the facts: The records of the commerce on the Chattahoochee, Flint and Apalachicola Rivers have been duly ascertained and recorded by the government, and for purposes of comparison I will go back to the year 1900. In that year the value of the cotton, fertilizers, lumber, naval stores and other merchandise handled by the steam-

boats plying the rivers named amounted to $3,700,000. This traffic steadily grew until in 1907 it had reached $13,500,000, and had thus nearly quadrupled in volume in seven years. The figures for 1909 are not yet complete, but notwithstanding its being an off year commercially the amount of freight carried nine months aggregated over ten million dollars in value. The commerce of the rivers of the whole country fell off in a greater proportion last year than did that of the Chattahoochee, and it is notable that while owing to the great falling off in timber and lumber shipments, on account of the depression in that business, yet the total tonnage was nearly normal, being made up by the increase in other classes of freight.

As has been well said by a competent authority in regard to the rivers, "There is plenty of room for argument that the present commerce on a river that has no harbor, which, in fact, may be considered as a long lake, is but a faint index to the possible commerce on such a river if it led to an harbor of sufficient depth for general export commerce. To show the rank of the Chattahoochee River in comparison with other Southern rivers, note the value of the tonnage of the following for 1908:

Savannah River, between Savannah and Augusta, $5,500,000; Altamaha River, $8,900,000; Ocmulgee, $6,700,000. This latter river on a mileage basis has received from the government about four times the amount expended on the Chattahoochee, the last appropriation in 1900 being $2,000,000 for a system of locks and dams for a distance of only 156 miles.

Columbus, Ga. is the only large interior textile center in the South, owning large developed and undeveloped cheap hydro-electric power, which will be able, upon the completion of the Panama Canal, to ship cotton goods by an all-water route to the Orient. Think for a moment, of the immense significance of this fact, the realization of which will surely come if it is given the recognition its importance demands at the hands of the national government.

Low cost power to make the goods in the very heart of the cotton belt, and low all water freight rates to the countries that import most largely of the coarse fabrics now made in the South; could power and navigation be linked together more naturally, more effectively and for a greater supremacy? No competition in this country or abroad could undersell us, and if the men of Columbus will realize this great opportunity and help in the efforts to secure a permanent deep water connection, a rich reward will surely be theirs. Then instead of a commercial population, estimated now at forty thousand, and ranking as the fifth city of Georgia, Columbus will take her place where this God given birthright will put her, as the greatest cotton manufacturing center of the South, and treble her population in the next quarter of a century.

That I am not "building castles in Spain," let me give you one instance in the actual commercial life of our city to-day. During the last two years one cotton mill in this city has exported to Shanghai, China, $390,000 worth of cotton goods. How did the goods get there? By taking one of the longest railway journeys that can be mapped out across the continent, from Columbus, Ga. to Vancouver, B. C., a distance of 4,049 miles, and then across the Pacific Ocean to Shanghai, a distance of 5,682 miles; a total journey of 9,731 miles. The freight rate per 100 pounds is $1.25 of which the railroads received $1.05; thus for less than one-half of the total distance the railways received five times the amount that the steamboat company was paid. The distance from Columbus to Shanghai, via the Chattahoochee River and the Panama Canal, would be approximately the same as the rail and water route named above, but if cotton goods can be carried across the Pacific for 20 cents per cwt., it will be easily seen that the present rate of $1.25 would probably be more than cut in half, by an all-water route.

Columbus has made rapid strides as a manufacturing center during the last decade. In 1898 we had only 72,000 cotton spindles, while we have to-day in operation 175,000. Great progress has also been made in other lines of manufacture, the most notable being the greater diversity than formerly. Actual figures taken from the books of the concerns engaged in manufacturing alone in this city show the following figures for their 1908 business:

Textile plants	$ 5,637,000
Commercial fertilizers	2,600,000
Iron works and foundries	995,000
Show cases, furniture, etc.	500,000
Wood working plants	450,000
Cotton gins, presses, etc.	400,000
Cotton seed oil mills	335,000
Ice and bottling works	290,000
Brick and concrete works	270,000
Wagons and buggies	250,000
Syrup refineries	225,000
Marble works	120,000
Miscellaneous articles	393,000
A grand total of	$12,465,000

This is an increase of over 100 per cent. in ten years. During the same period the following increases are notable: Increase in bank clearings, 49.6 per cent.; increase in postoffice receipts, 73½ per cent.; increase in street railway earnings, 103 per cent. The taxable values of Columbus have increased in ten years from $9,773,209 to $17,929,340, an increase of 54½ per cent. Columbus in 1908 received 169,000 bales of cotton valued at $9,295,000. Of this cotton 105,000 bales were compressed at Columbus and re-shipped. The balance, 64,000 bales, was handled by the Columbus cotton factors. The local mills consumed 50,129 bales, valued at $2,757,000. The goods made from this cotton were shipped to every State in the Union, Canada, and to the following foreign countries: China and Turkey in the East taking large quantities of gray goods, while the product of our colored goods mills have largely been exported to the West Indies and the South and Central American Republics. Thus from these exports will be readily seen the paramount necessity of a deep water connection for this city. In addition to the manufacturing and cotton business of Columbus, a large jobbing business is done in all staple lines, and they as well as the retail establishments do a large freight business via the river in dry goods, boots and shoes from the East, and in provisions and grain from the West.

I now desire to call attention to the proud boast of Columbus, the "Electric City of the South" and that is her hydro-electrical power development. This great development of cheap power has come to her recently and with great rapidity, and now 8,500 electric horse-power has supplanted steam power in operating the majority of the industries of Columbus. There are at present 75 different companies using electrically-driven machinery.

The greatest water-power in the State of Georgia and perhaps the greatest of the eastern Appalachian range of mountains is embraced in the various falls and rapids of the Chattahoochee River. Important developments have been made near Gainesville, Atlanta, West Point and Columbus, those at Columbus being by far the most important. Between West Point and Columbus, a distance of 34 miles, there is a fall of 362 feet, while a fall of 240 feet of this is practically situated right at our doors and at the head of navigation.

The three developments already made at Columbus aggregate about 20,000 horse-power and are estimated to be saving more than $250,000 per annum to the industries now utilizing it when compared with the cost of steam power. Immense sums of money have been invested in the different water-power developments, those at Columbus alone with the allied industries dependent upon the use of the water-power aggregating more than $13,650,000. It is the intention of the Columbus Power Co., which has acquired extensive rights to all the available undeveloped water-power near the city, to install hydro-electric plants, and fully develop all this power. Much of the preliminary work, such as topographical surveys, etc., has already been completed, and careful estimates show that fully 60,000 additional horse-power can be secured by these developments.

Let us consider for a moment what this immense quantity of energy means; 60,000 horse-power is sufficient to propel about 2,000,000 spindles, or more than all the spindles contained in the mills in the State of Georgia; it is sufficient energy to drive the wheels of industries that will furnish employment to the "bread winners" of a population of 200,000 souls; 60,000 additional horse-power means a factory growth in value of $55,000,000, basing the calculation on the growth which has already taken place through the developments made. These stupendous figures serve to illustrate the great potentialities that exist here and that will continue to grow in importance. They should also serve to emphasize the necessity of improving the navigability of the Chattahoochee River and the water systems with which it connects.

The conservation of this energy is of paramount importance, and the watershed feeding the river and its tributaries should receive that protection from the Federal government which is being extended to other sections of our country in forest reservation and preservation. The flow of the river fluctuates to such an extent that it is only safe to depend upon the figures given above as to the available useful power; and even these estimates include steam relays to tide over periods of extreme low water. A steam relay of 3,000 horse-power has been installed for this purpose by the Columbus Power Co. If it were possible, however, to control the flow of the river by reforestation and the impounding of the water by large reservoirs, the available horse-power would easily be doubled, in fact engineers have estimated that 210,000 horse-power is available between Columbus and West Point with an average flow of the river.

Topographically the business section of Columbus is well located, being on a plateau above the reach of the worst freshets that have ever occurred in the river, and we have never had the damage from floods which have wrought such havoc in some Southern cities. The fluctuations in the volume of water, however, have proven very annoying and costly to those manufacturing plants driven by direct water-power. Water is a good servant, but a bad master, and it is to give our commercial life full protection and to enable us to get the full benefits of power and navigation that we hold out our hat to "Uncle Sam," not as mendicants, but with the proofs in our hands of our growth and prosperity in authentic and unexaggerated figures.

What should we ask of the government? We should ask protection to the watershed of our river above Columbus; we should ask for a series of locks and dams from Columbus to the mouth of the Flint River to obtain a six-foot channel at all times; and we should ask the aid contemplated by the trade association to enable us at some point to unload from our river steamers to foreign bound ships, without the expense of lighterage.

We know our requests will be endorsed and approved by those members of congress whose districts are immediately interested, and I wish to testify to the aid they have given Columbus, and on behalf of the city to return to them our sincere and grateful thanks.

In the relationship of railway and water transportation I do not endorse the avowed hostility of some prominent railway systems to government aid for waterways. I believe a wise railroad manager will see added business for his road from a section blessed with good navigation facilities, just as he would from a section where good country turnpikes parallel his railroad. While water connection might lead to some readjustment of rates, yet the volume of business would certainly be increased. The railways will always have the bulk of the passenger services and all express and freight service demanding quick transportation. Where nature, however, has given a city water transportation for the heavier staple articles of commerce, government aid should be rendered, if necessary.

Such is the story of Columbus, Ga., the "Electric City of the South," and while my theme has been wholly commercial, no allusion to this city would be complete without two other features of our municipality receiving the recognition they deserve. Our school system, wherein industrial training is conceded by educational experts to receive the most elaborate and intelligent application in connection with the future of our people, than is found in any other city of the South; and our magnificent system of street improvement, which, within the next ten years, will make us also the "City Beautiful of the South." My sole aim has been to try and give a brief business summary of our important standing when power and navigation are considered, together with our civic achievements.

After a belt has been in use for some time, its surface takes on a glaze. This results in losses due to slipping, always accompanied by heating, and draws the natural oils to the surface, causing them to evaporate. This condition further leads to the belt's getting stiff and hard, and lessens the angle of wrap (the angle between the extreme points touched and covered by the belt on the pulley).

Without attention belts are almost sure to deteriorate as above described. Their efficiency is increased and their life lengthened according to the treatment they receive. To prevent the formation of surface glaze and the slipping accompanying it, it is the best practice to use a reliable belt dressing. This dressing should be of a nature that will not only offer temporary relief, but that will penetrate through the surface of the belt and replenish the natural oils. This will result in keeping the belt pliable and preserving the original efficiency.

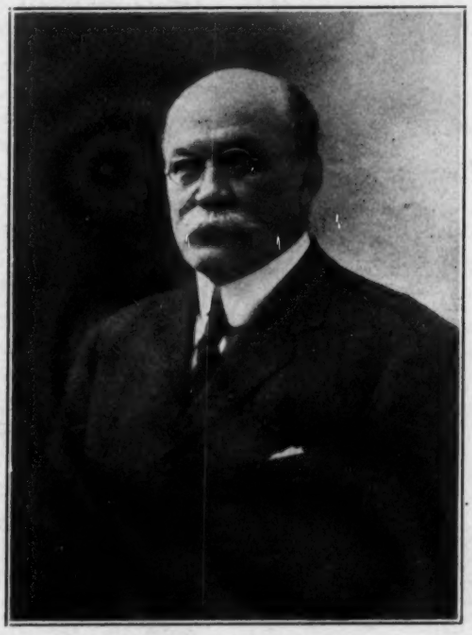
Importance of Railways in the Upbuilding of the Industries of the South.

(Contributed exclusively to COTTON.)

BY W. W. FINLEY, PRESIDENT SOUTHERN RAILWAY CO., WASHINGTON, D. C.

If any community is to produce profitably more of any commodity than can be consumed by its own people, this surplus must be carried to other localities where there is a demand for that particular article. Transportation is thus an indispensable factor in industrial development. It is essential, not only to the distribution of finished products, but also to the concentration of raw materials. We find, therefore, that, in all ages and in all lands, the growth of industrial communities has been largely influenced by the availability of means of transportation.

Before the invention of the locomotive engine, the most efficient means of transportation was by water, and we find that, from the dawn of history, those communities having the advantage of either natural or artificial waterways generally had the most highly developed industries. In those days large centers of population at any considerable distance from navigable waterways were almost unknown. Water transportation is now and will continue to be, an important factor in industrial development. It is essential, of course, to the marketing of products in countries that can be reached only by way of the sea, and it is an important supplement to rail transportation in inland commerce wherever it can be made available. The navigable rivers of the South and the harbors along the South Atlantic and Gulf coasts have contributed materially to the past industrial progress of our section, and our future progress will be aided by the further improvement of our harbors and of our inland streams wherever they can be made efficient carriers of commerce.



W. W. FINLEY.

In the present stage of transportation by rail, however, inland waterways, even where they are most efficient, are not, by themselves, sufficient for the highest degree of industrial development. They are highly efficient carriers of some classes of traffic, but the railways must be relied upon for carrying other classes, and we find few, if any, important industrial centers dependent altogether upon water transportation. We do, however, find many important industrial localities entirely dependent upon rail transportation, for the railway has brought them into touch with the markets of the world. Without rail transportation the industrial map of our Southeastern states would be very different. Manufacturing on a large scale would probably be confined almost entirely to our seaports and to the banks of our navigable streams. The Piedmont cotton mill industry, as we know it to-day, the Alabama iron and steel development in its present proportions, and a populous city with a large variety of thriving industries on the site of Atlanta, Ga., would have been impossible. These interior Southern localities without waterways would doubtless have been almost exclusively agricultural, with a considerable development of household and neighborhood industries to supply local wants, but without any considerable development of manufacturing under the factory system.

The dependence of a large proportion of the industrial communities of the South upon rail transportation for the concentration of raw materials and fuel, and for the marketing of finished products, gives to those communities and to the entire section a vital interest in railway efficiency. The extent to which production can be increased depends upon the extent of railway carrying capacity, and every increase in that capacity is equivalent to an increase in the industrial possibilities of the section.

The extent of Southern resources is so great, and Southern opportunities are so abundant and varied that we may confidently look upon the industrial progress of the past thirty years as but the promise of what is yet to come. Our resources and our opportunities are daily becoming better known, and I believe that we may expect our industrial progress to continue at a rate at least equal to that of any other part of the country. If this expectation is realized it will mean a corresponding increase in the demand for transportation facilities. I believe, therefore, that it should be the policy of the railways of the South to concentrate their resources, as far as they properly can, upon increasing their carrying capacity, especially in the way of providing double tracks on the more congested parts of their lines, increasing the trackage in congested terminals, and providing additional cars and locomotives as they may be required. If this policy is to be carried out as rapidly as will be necessary to keep pace with the increasing traffic, investors must have confidence in the section and in its people, and its railway managers should be supported by a public opinion which will recognize the fact that the extent to which increased facilities can be provided will depend upon the degree of railway prosperity.

Industrial development in the South has been chiefly in the way of manufacturing Southern raw materials, and future progress will be along the same general line, but I believe that the next great step in this development will be in the direction of greater diversification of manufacturing. At present a large proportion of Southern raw materials are converted into commodities which are shipped to other

localities to be still further manufactured before being ready for the final consumer. A larger proportion of this secondary manufacturing should be done in the South, and I believe that more of it will be in the future.

One of the factors in encouraging this greater diversification will be the expansion of Southern markets. Side by side with the industrial development of the South, an agricultural development is in process. Southern farmers are constantly giving more attention to diversified agriculture and to the adoption of improved methods of farming. This, taken in connection with the ever increasing demand for cotton and for Southern fruits and vegetables, will tend to increase the purchasing and consuming power of Southern agricultural communities. In addition to this the establishment of every new industry giving employment to additional individuals increases the demand for the products of industries of all kinds. The railways, too, as they increase their facilities, will increase the number of their employees, to the advantage of both the farmers and the manufacturers. As agricultural, industrial, and transportation development continue, therefore, Southern markets for commodities of all kinds will increase in importance and may well be given increased consideration by Southern manufacturers.

Another field to which I would suggest that it may be profitable for our manufacturers to give special attention is that of the Latin-American countries. Mexico, Central and South America, and the West India Islands consume large quantities of goods that can advantageously be manufactured in the South, and the Southern manufacturer has a geographical advantage with reference to the markets of many of these countries. The completion of the Panama Canal will facilitate reaching, not only the west coast of Central and South America, but all the markets of the Pacific Ocean. It will still be some years before this waterway is completed, but I do not believe it is too early for our Southern manufacturers to be giving attention to those markets, bearing in mind that those first in the field will have a certain advantage over their more tardy rivals.

With this advantage of climate and of resources, I believe that the Southern manufacturer may look forward to the new year and to succeeding years with confidence, and that through the united efforts and mutually helpful cooperation of farmers, manufacturers, and railways, Southern agricultural and industrial development will be carried to a constantly higher level.

CONSUMPTION OF COTTON GOODS IN TURKEY.

The wearing apparel of the natives of all classes is largely cotton goods. The consumption in this respect is enormous. All through Turkey and southern Russia, as well as in the adjoining countries of Bulgaria and Roumania, the loose, flowing garbs of both sexes, on the farms and in the cities, are such as to require quantities of both fine and coarse or heavy weaves of cotton sheeting, drills, and ducks. American "cabots," representative of these classes of goods, are finding sale, and so urgent has been the demand at times that the terms of some American exporters for payment three months in advance of receipt of goods have not seemed to lessen the requirement. It is open to question whether the more favorable credit terms of English and European shippers will not soon direct this trade to other channels.

In Europe the population of Turkey proper is estimated at 6,130,000, with 17,680,000 in Asia Minor. Constantinople is considered by good authorities to contain at least 1,200,000 people. Of these, in round numbers, 200,000 Greeks, 10,000 Germans, 7,500 Austrians and French, 5,000 Italians, 2,000 English, and possibly 300 Americans are permanent residents. The natives are of all degrees of Turkish and Arab origin. Many thousands of them are well to do or wealthy, broad minded, and ready for the awakening to which the nation and Constantinople in particular are rapidly advancing.—CONSULAR REPORT.

BOILER SCALE AND ITS PREVENTION.

BY ARTHUR D. LITTLE.

All water, especially surface waters, contain more or less mineral matter in solution. This mineral matter remains in the boiler as an incrustation when the water is boiled away or converted into steam. The mineral ingredients most commonly found in water and which cause the formation of boiler scale are the salts of calcium and magnesium. When the water is converted into steam, these substances gradually separate out from the solution in the form of deposits and coat the inner surface of the boiler with scale.

Scale formation is detrimental in several ways. It is a non-conductor of heat; the fires must therefore be driven harder to accomplish the same results. The water becomes separated from the boiler plates and these latter become overheated and are gradually burned out. The tubes and feed pipes of the boiler become more or less clogged, and consequently become less efficient. Some of the scale-forming ingredients, especially magnesium chloride, also exert a corrosive action upon the iron.

The aim of a boiler compound is to convert these substances into insoluble compounds which settle in the form of sludge or mud and can be removed from the boiler by blowing or washing. There are nearly two hundred materials which are known to have been used for boiler cleaning purposes, but there are only four of these which we will mention. They are:

Soda ash, or sodium carbonate.
Caustic soda.
Tannin.
Kerosene.

Soda ash is an alkali and will neutralize any acid in the water, and also precipitates salts of lime, magnesia, iron and alumina, in the form of soft sludge which can be easily removed when the boiler is cleaned.

Caustic soda is also an alkali, and neutralizes acids and aids in the precipitation of the various salts.

Kerosene is used in connection with the above to prevent foaming or priming.

Tannin is also used to prevent foaming or priming, and will precipitate certain mineral matters, although it is not so efficient in this respect as soda ash or caustic soda.

Cotton duck is the basis of rubber belting and all kinds of hose. Sales to these branches of trade amount to 50,000,000 yards annually. Millions of yards of cotton cloth are used in large cloth signs and advertisements.

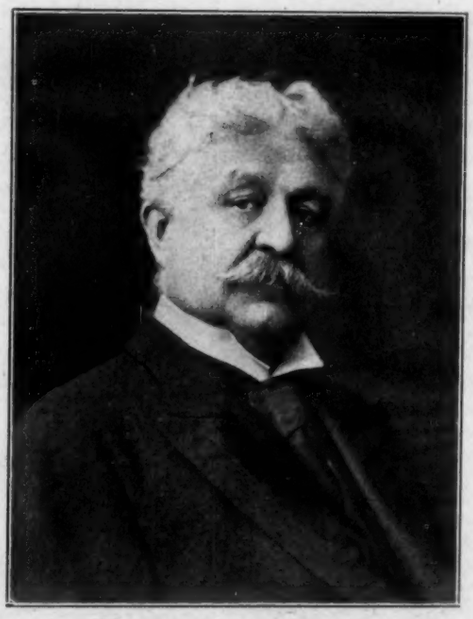
The Relation of Banks to Southern Industrial Development

(*Contributed exclusively to* COTTON).

BY ROBT. J. LOWRY, EX-PRESIDENT AMERICAN BANKERS' ASSOCIATION.

The banks and bankers of the Southern States were never more deeply interested in industrial conditions surrounding them than they are to-day. Development along all lines in the Southern States has been phenomenal during the last 25 years, and industries of every description that have been inaugurated here have been profitable to their sponsors. Cotton and its by-products have created a great industrial activity never before contemplated in the history of our section. Not alone in cotton, however, has industrial activity been apparent but in all lines of industrial development our progress has been steady, healthy and stable. Besides building cotton and cotton oil mills, we have erected plants for the manufacture of naval stores, furniture factories, warehouses, smelters, foundries, saw-mills, and other plants of various characters too numerous to mention.

Our cities have become great railroad and manufacturing centers, and our towns have been active markets for the handling of the great and increasing agricultural products of our section. Be it said with pardonable pride that there is hardly a county site town in Georgia, which has not a cotton, yarn, or knitting mill. We are manufacturing yarn, cloth, blankets, rugs, and even woolen clothing, and we are awake to the vast possibilities of our almost unlimited water-power, our boundless natural resources, and our natural industrial environment.



ROBT. J. LOWRY.

The industrial future of the Southern States can of course be but a matter of conjecture, but conditions now seem to indicate that the South within a few years will be on a tidal wave of industrial activity, of which we can at this time scarcely conceive. Within a comparatively short time the great Oriental markets, which are rapidly becoming large consumers of our raw and manufactured products, will be within our easy reach on account of the opening of our Panama Canal, and this Asiatic trade will mean millions and millions of dollars annually to the South. In my humble opinion, I regard the digging of the Panama Canal as one of the master strokes of this country in the pursuit of its foreign commercial policy. I regard it as the means of opening up an almost limitless field for Southern commercial activity in the exporting of our surplus crops and manufactured products.

The whole country should appreciate the immense cotton crop of the South, for it adds such a vast amount of virgin wealth to the entire country every year. It is a crop, which in its raw state is worth about $600,000,000, and now that such large quantities are being consumed by cotton mills in the South, and with its by-products, the total value to this section amounts to considerably over a billion dollars. In the South we raise about 75 per cent. of the world's supply of cotton; and it is a gold-producing crop. The conversion of the raw cotton into finished products has been one of the most important agencies in making the Southern States a manufacturing section, which hitherto was almost solely an agricultural one.

The fact should not be forgotten that in all of this industrial development, which has taken place in the Southern States in the past three decades, the banks and bankers have played their important parts. They have financed these great industrial enterprises, and fostered the substantial growth of Southern industry by extending to each and every worthy enterprise and its promoters the moral and financial support necessary for its growth. Probably many of the large plants now successfully operating in the Southern States would doubtless have never been inaugurated, but for the substantial aid pledged and furnished by the patriotic bankers of our section. After being successfully launched, probably some of them might not have been able to pass the embryo period of operation, if the strong arm of the banks had not been behind their efforts and determined to enlarge the volume and scope of their business.

The inauguration of scarcely any enterprise of sufficient size to attract attention was not even contemplated until the advice of leading bankers was sought and obtained, and its organization in most instances depended upon the pledge of the banks to lend their co-operation and financial support to the movement. In short, the relation of the banks to the industrial development of the South was and is so close that we may call them an integral part of it. Certainly their interest in these enterprises is more than friendly, for they are vitally interested in their success, and it is too well known to need further comment here that the banks only prosper when all enterprises are prosperous, when the whole people are active and successful, and when wage-earners have employment at good wages.

In Georgia we have to-day 100 national banks, and about 520 State banks, with paid-in capital, surplus, and deposits aggregating considerably over $100,000,000. Practically all of the smaller banks in our State at the present time do a larger business than was done by the largest banks in the State, 50 years ago. Our bankers are safe, conservative, pains-taking men of the very highest order of integrity, and they enjoy the confidence of our people. There have only been two or three bank failures within our State in

the past ten years, notwithstanding the rapid growth in the number of banks in that period. To give a definite idea of their numerical growth, I will state that within the past six years there have been chartered within the State of Georgia, 54 national banks, and 297 state banks.

The question might reasonably be asked "Why has this rapid increase in the number of our banks come about?" I answer that question by saying that this is entirely due to the rapid development along all lines of the commercial and industrial activity in our State within the past two or three decades. The necessity arose for greater banking facilities, and the banks were therefore established. Now that the banks have been established, and are doing business as such, necessarily they are deeply interested in the progress and welfare of this fruitful section. They are deeply interested in any agency, which may help to develop our section, and they are likewise deeply interested in whatever may be of substantial benefit to the whole country. Whatever is of interest to the country at large, or any section of it, whatever concerns commercial or industrial growth, likewise interests and concerns the bankers. If banks prosper, there must be stable conditions throughout the country, and general commercial growth and prosperity, and any enterprise or measure, which tends to produce these results, as well as elevate the standard of our citizenship, appeals to the bankers of our country both as business men and patriots.

The bankers believe too that what helps our section, helps the entire Union; what aids Georgia commercially, industrially, or morally, I may say, aids Massachusetts; and, if the entire nation works in harmony, the one section helping the other, the whole country necessarily enjoys general prosperity. The relations, which exist now, are such as to produce this natural result, and it is right that it should be so. The bankers throughout these United States are alive and alert to every opportunity to promote substantial growth in every line of endeavor, where the good of the country and the welfare of its people are vitally concerned.

The people of this section owe a duty to the banks, which they are gradually recognizing, and this helps the general financial tone. They are gradually learning to appreciate the convenience of banking, and that they should not hoard their unemployed money, but should deposit in banks, and thus allow it to do its part towards augmenting the general commercial progress of the community. To withdraw actual money from circulation does proportionately as much harm to commerce as to withdraw blood from circulation within the human system. To a great extent it is a part of the work of the banker to educate his people along the line of proper appreciation of the objects of the bank, as well as to steadily improve banking methods and practice, to accord with the demand of the times. Such a banker is not only a public benefactor, but a moving spirit for the commercial growth of his community.

I am disposed in this connection to congratulate the people of Georgia both upon their banking facilities, and the personnel of their bankers. It is their object to keep banking in Georgia on the high plane it has always occupied, to serve the people faithfully and efficiently, and to play their active part in the general development of the State's natural resources for the benefit of the whole people. In this general material development of our great State, which depends in such a large measure upon the ability and integrity of her banks, no State has more reason to be proud of the fidelity, conservative ability, and patriotism of her bankers, than the great State of Georgia.

Southern Prosperity and the Southern Farmer.

(Contributed exclusively to COTTON.)

BY CHAS. S. BARRETT, PRESIDENT FARMERS' UNION.

I hesitate to deal with self-evident truisms, but I believe that both the farmers and business men of the Southern States can not too vividly realize the close inter-connection of the Southern farmer with the prosperity of this section. We have seen this fact illustrated too often to require elaboration. During those "lean years" when the South was struggling with the problem of the mortgage, the impoverished farmer was the symbol of the impoverished business man, the impoverished clerk, and the wageworker in every calling.

CHAS. S. BARRETT.

Now that we have cleared off the greater portion of our debts, created by the stringency of reconstruction, and now that cotton is receiving approximately a fair price in the world's markets, the Southern farmer prospers splendidly, and carries with him the fortunes of the business man, the clerk and the wage-earner, into higher regions.

With the opening of the new year, it is to the distinct, material and moral advantage of both parties to this involuntary compact to keep the fires of Southern prosperity glowing. To do that the farmer must look well to diversification, raising his food supplies at home, and keeping his cotton crop well within the bounds of the demands of consumption. On his side the business man must co-operate more closely with the farmer, by encouraging him toward diversification, and by discouraging the temptation to raise a so-called "bumper crop." The organized farmer can accomplish marvels through his own efforts; he can accomplish more, for himself and the South, with the aid of the business neighbors. It therefore seems to me that a more intelligent concert of action between these two premier Southern factors is the keynote for 1910.

The South as a Manufacturing Field.

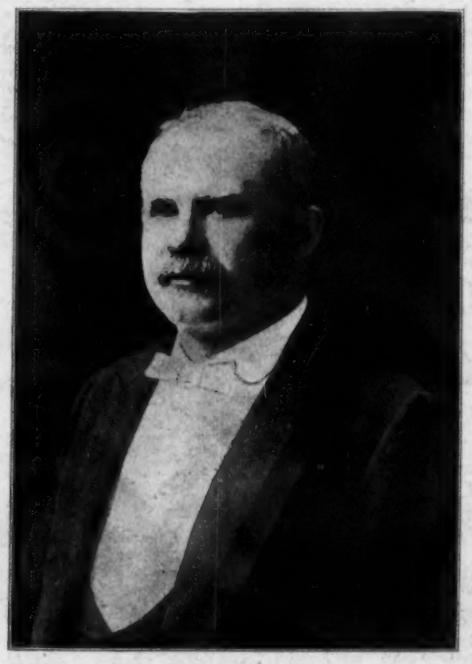
BY M. V. RICHARDS, LAND AND INDUSTRIAL AGENT, SOUTHERN RAILWAY CO.

The South as a whole is pre-eminently an agricultural territory, and as the conditions for successful agriculture of many kinds are so apparent, and the wide extent of unoccupied good farming land is so easily available, it is highly probable that this section will always be more largely agricultural than manufacturing.

However, it is safe to say that the South is to-day the best field for the establishment of a wide variety of industries, to be found in any section of the United States. The recent extraordinary expansion and development in manufacturing enterprises are remarkable, and clearly demonstrate that a steady growth is to be expected in the future.

The very fact that the South is now and will probably remain largely agricultural serves to emphasize its advantages and possibilities industrially. In the United States, conditions are such that the most successful factory communities are adjacent to the farm or farm supplies. Industry and agriculture go side by side ,and each serves to supplement and strengthen the other. One of the many advantages that this country has over other great manufacturing and commercial nations is that it raises abundant crops large enough not only to feed itself, but to become an exporter of foodstuffs to the manufacturing countries of Europe.

The net results of this condition are a lower cost and a better food supply for American factory towns, and a far greater home market for American factory products. By a similar process of reasoning, the section that has abundant crops along with its manufacturing enterprises, should be considered in the best economical position.



M. V. RICHARDS.

It is only within the past twenty or thirty years that the Southern States have figured to any appreciable extent in the industrial development of the country. As late as 1880, there was little coal mined south of the Ohio River; the value of the iron ore deposits of Tennessee and Alabama had hardly begun to be recognized, and as a consequence only a few small furnaces had been erected in those sections. The forests of the North were furnishing nearly the entire output of the country, and if there were any furniture factories in all the great region south of the Ohio and Potomac Rivers, they were very small and of little consequence.

Furthermore, cotton mills were comparatively few, with none at all in much of the territory which is now so well known for its textile plants. The cottonseed oil mill industry was just starting and the great fertilizer plants were not built. There was not a glass factory below Mason and Dixon's line except upon its border in West Virginia. The clay industry, save for small brickyards, was undeveloped and not a fruit and vegetable growing district supported a canning plant. Even the vast supply of bark in the hardwood forests was scarcely drawn upon for a tannery, while a score of various lines of industries, which to-day utilize the South's raw materials, her fuel and her water-powers and sell their products in Southern and Northern markets and in the marts of the world, were utterly neglected.

The South sent into the North or to Europe in those days for its cotton goods, clothing, shoes, furniture, nails, steel, tools, machinery, plows and vehicles. The rails for its badly equipped railways had to be obtained from the same source, as well as nearly everything else which was not the product of the home or of the village mechanic. Indeed, there were very few Southern people who really knew of its wealth of raw materials for all kinds of industries, and fewer still there were some who had a conception of the great value of these materials to the South. Even these few far-sighted people made practically no effort to utilize this dormant wealth or to encourage the outside world to make any use of it, and only a small number of pioneers from other sections had made investigations looking to the utilization of the South's industrial advantages.

Really wonderful have been the changes since that time. Slowly at first, then with increasing rapidity, the South has been forging steadily ahead in industrial development, a development along widely different lines, and in nearly every section, utilizing its raw material, putting to work its local capital and labor, and attracting additional capital from the North and Europe. It has taken advantage of the latest devices in labor saving machinery of the giganic wheels and dymanos for the developing of its vast water-powers. Everywhere the people have been seized by the ambition for industrial growth and power, for they have recognized its meaning to them and their locality; everywhere they are showing a commendable spirit of encouragement towards industrial development.

The waste waters from yarn bleaching can be purified by treatment with sulphuric acid and filtration. The wastes produced in bleaching cotton piece goods can be purified by sedimentation, precipitation, and septic treatment, followed by bacterial filtration through sand or by precipitation with lime.

Annual Review of the Cotton Market.

(Contributed exclusively to COTTON.)

BY H. AND B. BEER, NEW ORLEANS.

Before commenting on the remarkable developments of the past year we desire to quote from our letter of December 12th of last year, when values were at the lowest levels for the past 5 years: "What might be the lowest levels of the season were recorded yesterday (December 12, 1908)." The above opinion was made one year ago to a day when middling cotton in the New Orleans market was quoted at 8¾ and contracts were at the lowest levels of the season.

To-day, one year later, middling cotton in New Orleans is quoted at 15 cents, the highest price for this time of the season since 1874, or 35 years ago. Our conclusions at that time were founded on the following conditions then existing; although we were in the midst of marketing the largest cotton crop ever grown, (13,826,000 bales), yet the European political situation was improving and the trade and financial outlooks the world over were decidedly more cheerful. All traces of the panic were fading and the world was at peace, nothing then being observable on the horizon of a disturbing nature except the Balkan affair, which difficulties were soon adjusted satisfactorily. As noted above, there has been an advance in the price of cotton of 6¼ cents per lb., or from $43.75 per bale to $75; a mere contract of 100 bales would have netted a profit of $3,125.

NEW ORLEANS COTTON EXCHANGE.

While it is not a question of how and why such a big advance was brought about or made possible, it follows nevertheless that since the trade and the public are so deeply interested in the staple to-day, it will not be amiss to explain. The fall and winter of last season were open, so to speak, with no rain worthy of mention, especially in the southwest, and particularly in Texas. This was the first drawback. Meanwhile trade continued to improve, forecasting the need of another large crop, and the wheels of industry were gradually but surely reaching their maximum capacity. During this interim the 7,000,000 farmers and farm hands had a full acreage prepared for the pitching of the crop, but the opening of spring was unfavorable for sowing the seed, no rain of consequence having fallen in Texas.

It was not until the last half of May that rains made their appearance in Texas and permitted planting operations in a general way. While climatic conditions were favorable during the spring and most of the summer in the South Atlantic States, the weevils had made their appearance in Texas, and were so numerous in Louisiana and Mississippi that much of the acreage planted in cotton was plowed under and put in diversified crops instead. To add to the unfavorable outlook in the central and western sections of the belt, rains set in throughout Louisiana, Mississippi and Alabama, the precipitation in the last two States being the heaviest at points for 25 years, and as the rains continued excessive all through the month of June in the Mississippi Valley and in Alabama, a great deal of land had to be abandoned.

Later in the year Texas complained of the want of moisture, little or no rain having been had in June or July. And when the trying months of August and September passed into history with the highest temperatures on record to their credit, and as the hot wave gradually spread all over the Central and East Gulf States, including Oklahoma and Arkansas, all hope for even a normal crop was dissipated. To cap the climax, one of the earliest killing frosts on record struck the northern portion of the Central Belt and a little later touched the whole belt, which hurt the Tennessee crop severely and put a stop to the making of a small "top" crop.

All the while prices continued to advance, having reached about 12 cents by September, in which month we placed ourselves on record again by expressing the opinion that the lowest prices of the season would probably be recorded that month, though at that time a big fight was on in the North to force the market down. Subsequent developments have been in keeping with our convictions. It was only on December 10th, that the U. S. Government Bureau of Agriculture estimated the probable crop at 10,088,000 bales of average 500 pounds gross weight. Until then, Continental Europe and New England had not taken the situation seriously; now they realize that they are confronted with conditions equally as strong statistically as in the famous Sully season of 1903-04, whilst there are 21,000,000 spindles more in the world to feed than there were six years ago.

The price of raw cotton is very high,—of this fact there

is no question—but the supply in the South is still about 2,600,000 bales less than one year ago, the crop promising to be about 3,500,000 bales less than last year, that is, about 10,300,000 compared with 13,826,000. Cotton is also in strong hands and will be hard to buy except at higher prices. Long staple cotton is unusually hard to buy and is very dear at that, the small Egyptian crop and the spreading of the weevil in the Mississippi Valley and Alabama having occasioned the extreme advance for this character of cotton.

India's crop, however, is about 500,000 bales larger than last year's production, but this is only a drop in the bucket. As to the prospects for next year's crop, much will depend upon the weather and weevils. Thus far this winter Texas has been devoid of sufficient moisture to put a satisfactory season into the ground, but it is probable that there will be a large increase in the acreage induced by the unusually high prices.

To no country but the United States can the world look for the greater part of its supply of cotton. America produces 67 per cent. of the world's total production, India only 14 per cent., Egypt 6 per cent., Russia 4 per cent., China 3 per cent., Brazil 2 per cent., and all other countries 4 per cent. The production of these countries in 1908, in bales of 500 pounds net weight, was as follows: United States, 13,002,000; India 2,914,000; Egypt, 1,275,000; Russia, 846,000; China, 600,000; Brazil, 425,000; Peru, 57,000; Mexico, 140,000; Turkey, 80,000; Persia, 50,000; all other countries, 185,000; total, 19,574,000.

The world's crops of 1909 will fall short of the production of 1908 by about 4,000,000 bales, or about 20 per cent. Notwithstanding the famine prices paid for cotton in the days of the American Civil War, when it sold as high as $1.90 per pound, India in 1865 only made 2,090,000 bales and the best she has done during the past 40 years was to make 3,926,000 in 1906. It is out of the question to suppose that Egypt is to supply the deficit, as her crops have remained stationary for the past ten years in the face of high and low prices, the production ranging from 1,075,000 bales to 1,400,000 in 1906. It is necessary to irrigate the land in Egypt in order to make a crop.

The South has a monopoly and in time will control the situation, if indeed she does not do so already. This section of the country is not only the greatest cotton producing section in the world, but is fast becoming the largest consuming center, having used up 2,560,000 bales last season out of a total of 5,060,000 for the United States against 8,097,000 bales for the whole of Europe. Ten years ago Southern consumption was only 1,151,000 bales compared with 1,771,000 by the North; to-day it is 60,000 larger than in the North. However, both sections are making rapid strides and it is only a matter of few years when America will consume more American cotton than England, Germany, France and Italy and the rest of the world put together.

The spreading of Christianity and science in Asia and Africa is accomplishing a great deal indirectly in this respect, and it is probable that the consumption of the world, which has grown at the rate of about 2 per cent per annum during the past ten years, will expand more rapidly in the not far distant future. On the other hand it looks as if it will be a hard task for the production of cotton to keep pace with the growing consumption, unless the march of the weevil be checked or the acreage be augmented to a considerable extent. The growing consumption is due to a considerable extent to the increased use of cotton sacks for commercial purposes, and to the population of the world multiplying more rapidly.

An appeal has just been made to Congress for an appropriation of $300,000 to fight the weevil, and this petition should receive the support of every one interested in the cotton trade, as short crops, while being as remunerative to the planter, do not make possible the prosperity that larger crops do, its loss being felt in traffic, in spinning centers, and the burden of high price falls on the people.

The New Orleans Cotton Exchange was started January 17, 1871, with a membership of 100. There were small transactions in futures thereafter, but it was not until the year 1880 that regular calls were inaugurated, commencing January 20th of that year. To-day the exchange owns its own home and is in a flourishing condition, its members being international in character. The membership now totals 486, including visiting members and clerks; all parts of the world are represented.

As a means of improving the New Orleans contract market certain changes have been made in the rules of the New Orleans Cotton Exchange that will redound to the benefit of the trade. This market has come into much prominence of late, as the result of the U. S. Bureau of Corporations lauding the New Orleans cotton contract as being better and fairer than any other similar sales note. The system of commercial differences has been retained and certificated; cotton has been made a part of the system, middling of to-day being the middling of next month or next year, which changes have filled all requirements and have met with the approval of the trade and the National Government.

As to the future course of values for raw cotton we are of the opinion, based upon the indicated supply and demand—crop about 10,500,000 bales, consumption about 12,500,000 bales—that if the cotton can not be had from this crop and invisible mill reserves, prices are due to go higher eventually. Stocks at Southern ports and inland towns are very light except at Memphis, and it is probable that there is less cotton in the interior than at this time last year, and in all probability even less than in the Sully season of 1903-04, as the following comparatives will indicate:

Year	1909	1908	1903
Estimated commercial crop	10,300,000	13,826,000	10,011,000
Amount marketed Dec. 10th	6,246,000	7,196,000	5,743,000
To be " after " "	4,054,000	6,630,000	4,268,000
World's Vis. Supply of Am. Dec. 10th	3,798,000	4,135,000	3,054,000
Total available balance of year ..	7,852,000	10,765,000	7,322,000

As will be seen by the above comparisons, exclusive of mill stocks, the world has less cotton in sight than last year for the balance of the season, by about 2,913,000 bales, and only 530,000 more than in the Sully year of 1903 when there was a famine with the turn of the new year. At that time prices in this market advanced to 18.14 for July contracts and to 16-7/16 per cent. for middling. The advance culminated as the result of an over traded market and the breaking out of war between Japan and Russia, two great cotton consuming countries. The world is at peace this year; there are no large weak lines outstanding, and there are more spindles in the world by 21,000,000 than there was six years ago, there being 133,000,000 this year against 112,000,000 in 1903-04.

The South's Cotton Crop.

(*Contributed exclusively to* COTTON).

BY HARVIE JORDAN, PRESIDENT SOUTHERN COTTON ASSOCIATION.

The estimated yield of the cotton crop in the South for this season, in bales of 500 pounds weight, was forecasted by the U. S. Bureau of Statistics on December 10, 1909, to be 10,088,000 bales. With the exception of the year, 1903, this is the shortest crop grown since 1899, and is over a million bales less than was grown in either 1897 or 1898. While we have had three crop years in the new century, namely in 1904, 1906, and 1908, each of which exceeded 13,500,000 bales in production, yet the average yield for the past ten years has hardly reached 11,500,000 bales, or but slightly in excess of the two crop years 1897 and 1908.

These comparative figures are very significant when the vast increase in the cotton acreage since 1898 is taken into consideration. The estimated cotton acreage by the U. S. Bureau of Statistics for the season of 1899 was 23,521,000 acres, and from this acreage a crop of 9,422,000 bales was produced. There has been an average increase of 1,000,000 acres annually for the past nine years, and with a little over 32,000,000, acres planted in 1909, the yield appears to be only about 650,000 bales in excess of the crop of 1899. The South seems to have reached the maximum yield of lint cotton per acre in 1898, when the percentage of yield per acre was 48 per cent. of a bale or 244 pounds. At no time since that year has the yield gone above 44 per cent., while the average for the past ten years has been only about 39 per cent., or 195 pounds of lint per acre.

HARVIE JORDAN.

It appears quite evident, therefore, that increased acreage does not indicate an increased production of the staple. The yield of lint cotton per acre for 1909 will hardly exceed 165 pounds per acre, or less by 75 pounds per acre than in 1898. While the enormous reduction in yield for 1909 can be largely accounted for by unfavorable climatic conditions, and the ravages of the Mexican boll weevil in the Southwestern cotton states, yet it can not be denied that the low average in yield for the past ten years, as compared with previous years, shows clearly that there is something vitally wrong with the present farming methods in the South as related to cotton culture.

My own opinion is that our lands have been farmed to death by an extensive system of cotton culture, indifferent preparation of the soil, too limited fertilization, too little of crop rotation and diversification. We are suffering from the same causes and paying the same penalties, which have reduced the wheat yields nearly one-half per acre in the Northwestern states within the past quarter of a century. Continuous planting of the lands in the same crop, year after year with but indifferent culture, has sapped the soils of their natural vitality, and we must remedy the evil by crop rotation, better cultural methods, and a heavier use of artificial plant foods. The effort of the future must be to increase the yield of crops on fewer acres planted to the plow, and apply modern scientific methods in the place of old-fashioned, antiquated ideas.

While we have not made an average increase in the yield of the South's cotton crop since 1898, the increase in the spindle capacity of the world has gone forward by leaps and bounds. In 1898, when the South produced 11,250,000 bales of cotton, there were in round figures 101,000,000 spindles in operation throughout the world, whereas, at the present time, the total world's spindles aggregate 131,000,000, or nearly a 30-per cent. increase within the last ten years in the spindle capacity, and practically no increase during that time in the average annual production of the South's cotton crop. If the South expects to maintain its monopoly of cotton production, it is quite evident that Southern farmers must prepare to meet the ever increasing demands of the world's population for clothing and the world's spindles for the raw supplies.

SOUTH HAS CAPACITY.

There can be no question as to the capacity of Southern soils to grow all of the cotton needed to supply the demand for centuries to come, as we have hundreds of instances each year of progressive farmers producing from one to two bales of cotton per acre on the apparently worn uplands of the old cotton producing states. Our yearly average is but little better than one bale to three acres on the entire area planted. It is also estimated that the present area planted is only about one-thirtieth of the land in the South available for cotton culture. At present, the march of the boll weevil is of very serious moment not only to the farmers of the infected territory but also to the cotton states east of the Mississippi River, and to the cotton trade generally. Those growers outside of the infected territory should begin at once to study the latest and most approved cultural methods, so that when the weevils do appear, cotton production can still go forward with only a minimum amount of damage.

The present high prices for cotton should enable the cotton growers to better equip their farms with improved implements and to begin at once a campaign for better farming that will tend to solve the many serious problems

which confront them in production at the present time. There is now very marked activity in the ranks of foreign cotton growing associations, especially in the countries of Great Britain, France, Germany and Russia. The failure of the South in the past ten years to increase production in the same ratio as in previous decades to meet the increasing spindle capacity of the mills, and the demand for cotton cloth, by the increasing populations of the world, is stimulating foreign countries to action in the exploiting of other lands for cotton culture.

The best authorities now agree that the present annual demand for American cotton has reached a total of 13,500,000 bales, and that this demand will call for a steady annual increase thereto of 500,000 bales for the future. Another reason why foreign countries are making an earnest effort to become independent of the United States for supplies of raw cotton is due to the enormous increase in cotton mill consumption in the South during the past quarter of a century. In the 12 months' cotton season of 1897-08, the cotton mills in the South and New England combined, consumed 2,900,000 bales, or about one-fourth of the total production of the crop for that year, whereas, present consumption in American mills calls for more than 5,000,000 bales annually, or half the entire production of 1909. Southern mills are now annually consuming nearly as much cotton as was consumed by all of the mills in New England and the South combined in 1897. It does not take an expert statistician to show that, if cotton mill construction goes forward in the South at even one-half the percentage of increase in the next twenty-five years which has signalized the past quarter of a century, American mills will be consuming the entire production of the South, unless a very material increase in the future cotton crops grown in this country takes place.

From 1842 to 1902, the cotton crop of the South has been doubled every fifteen years, not counting the Civil War period from 1861-05. Upon this basis for the future the American cotton crop should present a yield of 21,000,000 bales by 1917, but if the average yields of the past ten years is any criterion to the future, such an increase in the yield during the next eight years will be practically impossible. There were over 3,000,000 spindles in course of construction outside of the United States in 1909, while it is well known that marked activities in the extension of mills in the South are now going forward unabated.

California is now growing cotton, and reports indicate a yield this year of one bale per acre on the present limited area planted and properly cultivated. It is estimated that 500,000 acres of land in southern California are suited to cotton production, and that the industry will be pushed in the future under a system of artificial irrigation of the lands cultivated. Statistical data is oftentimes tiresome reading but I have felt impelled to present these comparative figures in the hope that attention of those most vitally interested might be aroused to the necessities of the future.

A YEAR OF PROSPERITY.

It is intensely gratifying to feel that all of those farmers who succeeded in growing a crop of cotton in 1909 have been rewarded with such splendid prices, and it should stimulate them to renewed efforts in the future. At the same time I am hopeful that the steady advance in yarns and finished fabrics will enable our mills to manufacture the high-priced raw product at a profit and keep their mills operating upon a satisfactory basis. I would admonish the cotton growers of the South not to become too much elated over the unusually good prices prevailing for their staple this season, and neglect that higher duty of making their farms self-sustaining by planting an abundant area in food supplies. The cotton area of the South is the greatest gold mine on earth, giving forth its renewed and inexhaustible supplies of raw cotton each year, every pound of which must be converted into gold dollars. Its production and profitable marketing should be fostered and encouraged by every interest in the United States to the end that the splendid natural monopoly which we now enjoy may be maintained for all time to come.

COTTON MANUFACTURING IN TEXAS.

(*Contributed exclusively to* COTTON.)

BY D. E. EARLE.

Texas is still a very backward State in the cotton mill industry. Almost every other line of work in the State is expanding more rapidly than cotton manufacturing. The percentage of its cotton crop, manufactured within the State, is smaller than a similar percentage in any other cotton-growing State, except Oklahoma.

The Texas crop of cotton in 1908 was 2,221,000 bales; and only 33,781 bales were used by the mills in the State in that year. In 1907, however, 42,000 bales were used.

Some of the business men in the State are now beginning to realize the possibilities of their cotton crop. In a bulletin published recently by the Commercial Secretaries' Association, some very interesting facts relative to the Texas cotton crop are given. Most of the crop is shipped to England. According to this bulletin, the Texas cotton crop is sufficient to give employment to 150,000 factory operatives in cotton mills for a year. To gather the crop costs $15,000,000; $14,000,000 to gin it; $2,000,000 for compressing it; $32,000,000 to transport it to England, and $200,000,000 to manufacture it. It is difficult to realize just what the manufacture of this cotton in Texas would mean to the State.

In 1904 the State Legislature established the Texas Textile School, at a cost of $60,000, as a department of the Agricultural and Mechanical School at College Station. Fifteen young men are now taking the course offered in this department.

The last Legislature passed a bill providing for the establishment of a cotton mill, to give employment to the convicts of the State. The governor and the board of penitentiary commissioners expect to locate the mill where water power is available for its operation.

The majority of the mills in Texas were incorporated within the last ten years; the capital stocks range between $90,000 and $250,000. From 80 to 350 operatives are employed in each mill according to its size; and from 1,000 to 7,000 bales of cotton are used annually by the different mills. The product of the mills is largely duck, drills, and sheetings, although crash and towels are also made in one or two mills.

The railroads of America consume 250,000 bales of cotton annually. Cotton duck is the basis of the airbrake hose; of enameled ceilings; the plush chairs are of cotton; the leather seats are of cotton.

Recreation for Workers.

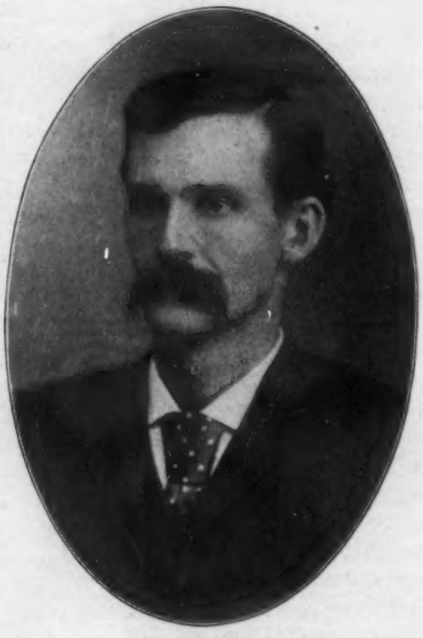
(*Contributed exclusively to* COTTON).

B. S. ROBERTSON, PRESIDENT HOLT-GRANITE MFG. CO., HAW RIVER, N. C.

Fifty years ago we were living under a civilization that not only did not demand work for the betterment of conditions for workers in the South, but operated against it. That was a civilization of ease and leisure that recognized few obligations and responsibilities, other than the maintenance of the system. Its chief aim was to till the soil, raise negroes and discourage manufacturing. Under it individual manhood was not reckoned as much of a factor; it was a question of land and slaves.

That civilization has, however, passed away and is succeeded by a new and better one. While the old had its attractions of ease and quiet with ample time for literary pursuits to the favored few, the new has opened up a broader, better field with enlarged opportunities. But it has also brought with it manifold obligations and responsibilities. While it has brought untold advantages to individual manhood, with greater incentives, it has also brought new civic, social and economic obligations that have to be met and fulfilled.

We are rapidly changing from a rural, pastoral population to an aggressive manufacturing and commercial people, rapidly drifting into towns and cities. Cotton mills, woodworking plants and foundries are springing up in almost every section; mines are being opened up and our railroad mileage is being extended and multiplied at an astonishing rate. Hence, the social system suited to our condition prior to the sixties is absolutely unsuited to our present needs under these new conditions.



B. S. ROBERTSON.

The purpose of this article is to say something with reference to recreation from the strenuous, energetic life that this new civilization has brought about. I hope to be able to touch a few of the vital points of this matter, and bring to the attention of large employers of labor, a few ideas that will start them to thinking along this line. I am sure if our people are once aroused on the subject, it will be settled wisely.

"All work and no play, makes Jack a dull boy," is an old and trite saying, but a truer one was never uttered; and the harder and more exacting the work, the more forcible is the application of this old maxim. The human system is so constituted, that unless it can have occasional relaxation from work, and corresponding upbuilding, replenishing of lost force and power, it begins to decline, and soon becomes incapable of work of a high standard. Man is no exception to nature's laws, and whenever he violates them mentally or physically, he pays the penalty sooner or later, just as surely as decay follows death.

Take a rubber band and subject it to a strong tension continuously, and it soon loses its elasticity and becomes worthless. Release the tension occasionally and it will retain its strength and last almost indefinitely. So it is with the human system; hold it to a high tension without relaxation and recreation, and like the rubber band it soon loses its strength and becomes worthless.

There is no doubt that "haste makes waste" in a great many cases. This is especially true when we attempt to accomplish an end too rapidly, at the cost of mind and body. We can accomplish much more work, perform our duties a great deal better, and preserve our health and vigor much longer, by occasional relaxation and absolute rest from our daily tasks. Like Antaeus of old, we must come back to mother earth occasionally for a renewal of our strength, if we would retain our faculties and accomplish something in life.

We can bear hardships and privations, endure hard work on plain living, and become more thorough and efficient in so doing, if we only heed nature's demands and give our bodies and minds the rest and renewal they absolutely demand, by occasional surcease from our work, and indulging in healthful recreation. We all know from experience that it is impossible to do our best work when we are tired and jaded. But we attain our highest efficiency when fresh and vigorous; thus proving absolutely that rest and recreation are indispensable to continued effective effort.

What does the word "recreation" mean? And why is recreation necessary? In the first place, it simply means making anew—creating again what has been used up or worn out. In the next place, it is necessary, because no worn out or run down creature, or machine, can do efficient service while in such a condition. Take for instance, the electric batteries in telegraph stations and other places; they have to be re-charged and renewed after a certain length of service, or they are worthless. Now if this be true in relation to inanimate matter, it is much more forcible in the case of man, for he has not only an animate body, but an immortal soul that requires infinitely more care and delicate treatment.

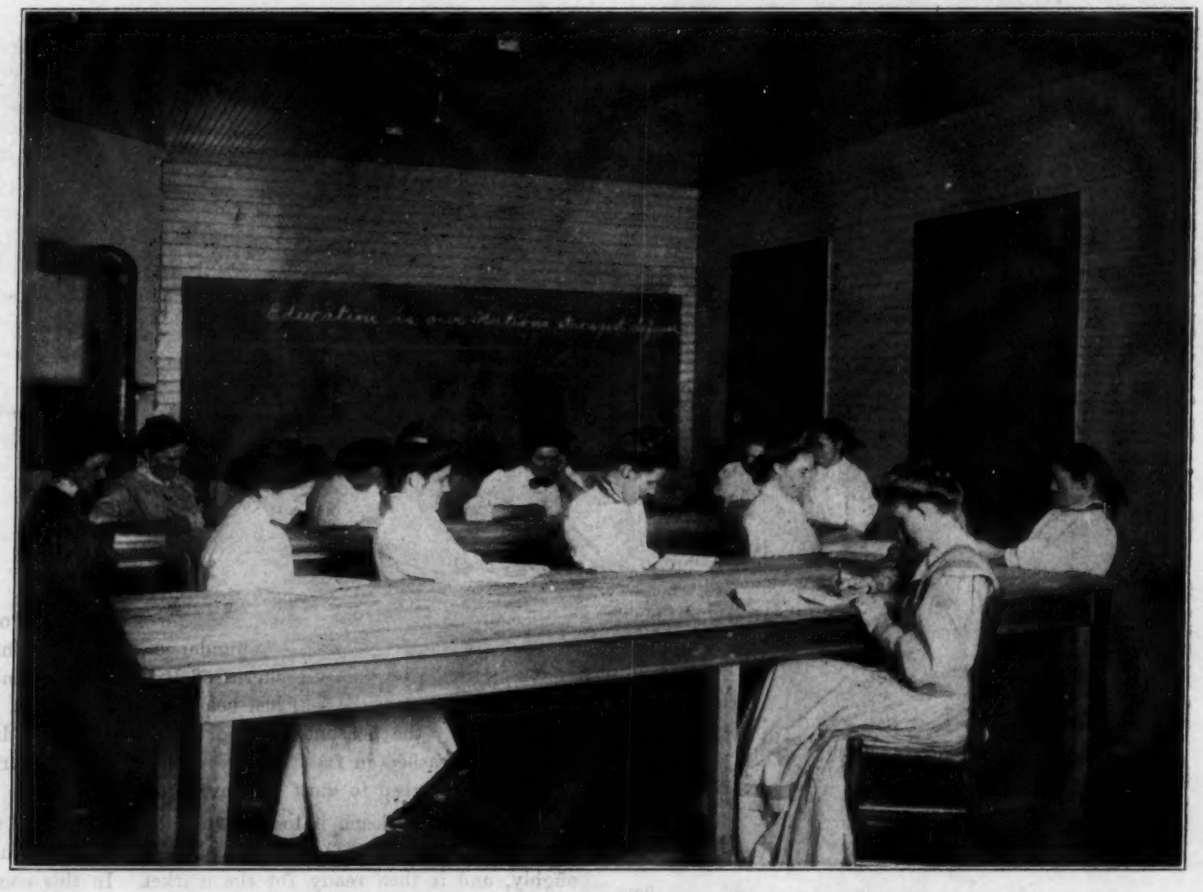
The Bible tells us that "Where much is given, much is required. And that where little is given, little is required." On this basis a great responsibility rests upon the man who to-day employs and controls large numbers of his fellow beings. His responsibility is of divine origin, and he can not conscientiously shirk it if he would; the true man would not if he could. He can only accept and discharge this responsibility to the best of his ability, as being of divine origin, trusting to the source of its origination for strength and power to do his duty. He has in his keeping, to a large

extent, the physical, moral, mental and spiritual welfare of his employees, and aside from the moral obligation imposed, his own self interest suggests the best possible care of those employed by him.

From the standpoint of pecuniary gain alone he is impelled to have a care for their well being; to treat them in such manner as will best preserve their brains and bodies. We would not kill the "hen that lays the golden egg;" this would be short-sighted policy. Neither would the far seeing, sagacious employer of labor grind the life and energies out of his employees by long and unreasonable hours of labor without the necessary rest and recreation. He would be just as unwise (and more so) to use up the surplus and reserve in his business, as he would be to consume the reserved energies of his employees. Reserved strength and capacity in a human being is just as essential, and more important than reserve capital and surplus in business. The wise manager would rather use up his reserve capital than the reserve force of his employees, for the one could be replaced, while the other, when once destroyed, is gone forever. The best work comes from the best class of work people; and the best class of work people are those whose minds and bodies are so conditioned and treated as to produce a gradually improved class of work.

Having arrived at the conclusion that recreation and rebuilding are so absolutely necessary and essential to our welfare, it behooves us to look well to the kind of recreation we take. Let it be distinctly understood that merely cessation from work is not recreation, and does not necessarily mean renewal of strength and energy. We have all doubtless seen instances in which the very opposite effect was produced; as Mark Twain very strikingly and humorously put it, "It is not hard work that kills men, but the fun they have between times." It is what we do with these "between times" as to whether we are benefited or injured by our period of cessation from work.

The average human mind will not be absolutely idle; there is no such thing as a perfect vacuum in nature, and our minds are sure to be occupied with something, and if they are not given to innocent, healthful, recreative indulgences and amusements during our spare moments from work, there is great danger that we may drift into practices that will not only be of no benefit to us, but do actual harm, and leave us in worse condition than when we began our vacation. It is, therefore, of vital importance as to the kind of recreation we take and that it be so directed and safeguarded as to bring about good results. The question then naturally arises, how is this to be done, and especially around cotton mill towns and villages where large numbers of people congregate, who are easily swayed and influenced.



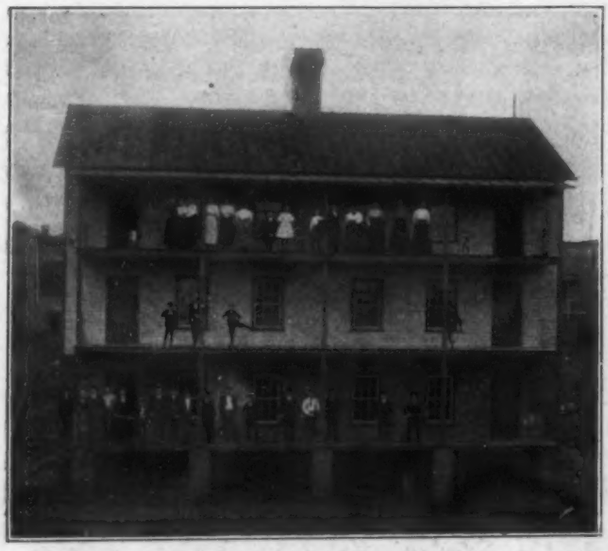
CLASS ROOM IN THE Y. M. C. A. BUILDING, HAW RIVER, N. C.

In my opinion the Young Men's Christian Association offers the best solution of this important question, and I say this after careful observation and experience. The work must be constant and continuing and must be under the management of the proper person.

HISTORY OF HAW RIVER ASSOCIATION.

On July 20, 1908, a branch of this association was organized at Haw River, N. C. The building was not ready for occupancy until November 13th, when we moved into it with 35 members. Our membership to-day is 125. On

December 15th we organized a ladies auxiliary with 18 members. To-day we have 52. The average daily attendane is about 68. Bible and educational classes are held in the association rooms, both of which are well attended. Two socials that were given last February were attended by 425 people. The building is equipped with water and electric lights, bath rooms and closets. The building is also supplied with pool tables, reading rooms and numerous small games, all of which are well patronized and enjoyed.



Y. M. C. A. BUILDING, HAW RIVER, N. C.

The most gratifying feature in this whole movement to me, is that the little boys take so much interest in the work. It catches them at a tender age, when they are easily influenced, and starts them off in the right direction giving them a wholesome outlet for their surplus energy.

It was my pleasure to attend the annual supper of the organization last spring. There had assembled 200 or more people from the little boys and girls of 12 years and under, to men and women upward of 60. A more congenial, contented and orderly meeting, it has never been my pleasure to attend. On my way to the building I was forcibly impressed with the absence of people from the streets, where they had usually congregated on Saturday nights, in a careless, drifting manner. When I reached the hall I could readily see why there were no people on the streets, for almost to a man, I found the very young men and boys there, who had formerly spent their Saturday evenings in idle gossip (and not infrequently in dissipation) on the streets, in the stores, barber shops and other public places.

Furthermore they are more careful of their personal appearance, and now when out of the mill, take their baths and present themselves in much neater form. It is not sufficient, however, to organize a Young Men's Christian Association; it must be in the hands of a capable man, or no headway will be made. We were fortunate in the man sent us to take charge of the association; and I think I am safe in saying that but for his tact and good judgment in more than one instane, we would have encountered serious trouble. As it is, we have overcome what little criticism did exist, and our village is now almost a unit in accord with the spirit of the association. We have started right, are steadily growing, and I think, have now passed the experimental stage.

Prof. Irving Fisher of Yale, has discovered that by proper living, in the way of eating, taking exercise in the fresh air, and an intelligent regulation of sanitary conditions, the limit of human life can be largely extended and the producing capacity of man increased by millions.

Finally, and above all other reasons, we should have recreation for the grand reason that man, as man needs it. We may harden our hearts and sacrifice our fellow man for sordid gain for a season, but in the final analysis of the case we are forced to admit that the dollar is secondary to the man. This consciousness is deep down in the bosom of every man and sooner or later, he is forced to give it expression. If this is not true, why is it that so many of our wealthiest men, after spending their lives exclusively to the accumulation of immense fortunes, turn round before the final summons reaches them, and give their money to purposes for the benefit of their fellow man? Why is it that they build libraries and hospitals and endow schools with such magnificent sums, if not in recognition of this belief? Why did Stephen Girard leave millions to build and equip colleges and training schools in Pennsylvania? Why did Mr. Peabody give millions for the cause of popular education? And why does Andrew Carnegie build free libraries all over the world and appropriate millions for the support of aged, indigent teachers? Why does John D. Rockfeller, who is accused of being the most grasping and sordid of men, turn over ten millions at a time for education, a million dollars for eradicating a malignant disease? The answer to all is that it is simply a manifestation of the divine spirit implanted in the bosom of every man, and an acknowledgment that next to our Maker, we owe more to our fellow man than to all other causes combined.

IRISH MOSS.

The plant called "Irish moss" (Chondrus crispus) is one of the algæ, and is found in abundance on the Atlantic coast of Ireland and on the shores of Brittany, in France. It grows on rocks in the sea, just below low-water mark. It is gathered by the peasants and spread in the sun to dry, after being washed in fresh water. When fresh, it varies in color from green to dark purplish brown.

The peasants bleach it to an extent by exposure to the sun and by watering, after which it is allowed to dry thoroughly, and is then ready for the market. In this condition it is of a light grayish yellow hue. It is stated that the moss may be bleached artificially by the use of permanganate of potash, but no moss in the Belfast market is bleached otherwise than by sun and moisture, as described.

The size of the plants is the controlling factor in price; the larger the plants the more valuable. Color also is a factor, the lighter colored selling better. The wholesale druggist gives an order for the required quantity to men who buy the moss from those who have gathered it. The moss in Ireland is put up for export in bales, just as it comes from the gatherers, without being subjected to further bleaching or any other process.

The moss is used to some extent as a food by the peasantry along the coasts where it abounds, and jelly preparations are made from it for the use of invalids. It is extensively used in textile manufacturing as a stiffening for calico in the printing process.—CONSULAR REPORT.

Selling Yarns—A Discussion of Methods.

(*Contributed exclusively to* COTTON).

BY T. H. S. CONE, NEW YORK CITY.

The prolonged chaotic condition in the cotton yarn market has resulted in the present general inquiry on the part of spinners as to the men and methods on the selling end, and there seems to be a determined disposition to locate the evil and develop something in the way of improvement. This is not only a spinners problem, but it involves users of the product of the spindles who have to maintain steady prices on their merchandise in the face of ups and downs of yarn prices. They are thus constantly in danger of being left high and dry, as from time to time they cover their actual requirements in the exercise of their best judgment.

Some of our friends on the spinning end seem to think that the only obstacle in the way of steadily advancing prices is impotence or poor judgment on the selling end, but in fact it is the inability of the houses to perform miracles. The selling end on the other hand is apt to think that its spinning friends should always have plenty of good cotton at the lowest cost of the season, and thus be able to make a price any time that will command the orders sought. I presume that it does not require argument to establish the fact that the cotton yarn business is very much divided, so far as the making and maintaining of uniform trade conditions are concerned. While these observations are from an experience with Southern yarn particularly, some general truths are involved that should be kept in mind to form correct conclusions.

A little history may suggest timely thoughts to good thinkers. It is generally understood that a commission firm was originally a consignment house which was supposed to take orders from jobbers, etc. from time to time, consistent with the production of the mill represented, selling more or less as the united judgment of the mill and commission house deemed best. Of course, prices in the market and cost of manufacture were the limits up and down.

All shipments from the mill were entered on unpriced invoices which were forwarded with the bills of lading. Accounts of sales were rendered monthly to the mill with cash covering the sales, less a commission of five or six per cent. This included a guarantee of the accounts. The mill had no interest in the customer except in case some special features arose, and in the event of shipping direct all expenses of cartage, storage, insurance, etc., on the merchandise were charged to the mill wherever possible. I believe at that time a commission house was a unique establishment comprising efficient organization, high merchandising ability and unfailing integrity. Such a commission house was not open for every account offered, and it was a problem for new enterprises to secure a right connection of that sort.

The temptation of the mills to spread out and buy large quantities of cotton when it was supposed to be cheap, developed a habit of borrowing money; and getting it easily from the commission house, opened the door for the long train of evils that have followed and well nigh discredited the whole system. These loans took the form of advances on merchandise or regular negotiable notes, always at the full lawful rate of interest. The commission house enjoyed ample cash resources; it had its own capital, besides the mill's money in hand on accounts paid before account sales were rendered, and the negotiable notes furnished by the mills themselves which were endorsed by the commission house and sold at the lowest rates the money market afforded.

Naturally this financing business showed great opportunities of development along profitable lines. Many conscientious and highly moral houses began to adapt themselves to the opportunity, and not infrequently hired a skillful office manager and accountant. As the consumption of yarn broadened by natural increase of population and under shelter of a protective tariff, all sorts of people went into building cotton mills. At first with ample capital, then with some capital and some debt; and finally in many instances, as history has revealed, with no capital, but notes, machinery debts and plenty of confidence. A little money was gotten together for cotton and pay roll. A Southern mill was run at very low cost in those days. Every bale of finished product shipped was consigned, and advances as much as the commission house would allow were called for; then when the account of sales was made up what went in and what was kept out of it were regulated solely by the extent of manipulating ability of the chief accountant or the limit of the conscience of the head of the firm. Some mills went so far as to say that they never got more back than the original advances. Sometimes the mill people would wonder and ask questions; then again they would visit the market themselves, where they were met with open arms and entertained in good fashion, and frequently packed off home without having accomplished any of the objects of their visit.

With severe fluctuations in the raw material market and with steadily increasing cost of labor cost, the mill management began to be more critical of the selling price, and at times insisted upon having their agents keep them fully advised of intended sales; then if prices were not satisfactory, the agents would be given limits from the mills. Competitors with cheaper raw material, or lower cost of manufacture, or who had determined to take the business, would carry off the contracts, and the limited agent found himself confronted with the necessity of cutting his commission or losing his outlet; and in time the mill would be asking for orders when none were to be had. Then they showed willingness to shade prices, or if that did not suffice, radical cuts would be made to get business. Such pressure was put upon the agent that he realized that orders had to be produced or the mill would look elsewhere.

Possibly yarn users were not buying at that time, although, of course, they would have to do so soon, so why not take a chance and give the mill an order for the yarn. It was a subtle suggestion but perfectly logical, and thus when the yarn shipments came ahead of the actual sales a merchandise account was opened and complications multiplied. When yarn orders of manufacturers were obtainable it often happened that the agent was able to send business to his mill at slight advances, and he conceived the idea of placing a few extra thousand pounds with the

spinner so that he would have something coming at a price which would enable him to meet the low man later on and get a little compensation for the risk he took to get his mill orders when none were to be had in the market.

This practice of purchasing on the part of the commission houses led to awkward complications when the market showed a tendency to decline, and it then became necessary for the commission house to dispose of its own holdings first; then it would take care of new business for the mill. Whenever the market softened the spinner would berate himself for not having more orders at the top prices, as he had naturally looked for his selling house to place all they could before the radical change took place. If an agent is loaded with unsold contracts, he is not in a position to do much for the mill, which then gets restive, watches the market reports and makes inquiries about the state of affairs in the trade. As the days go by and new business does not come in sufficiently to prevent accumulation, the mill answers inquiries from other selling houses which were formerly ignored or politely put aside. This brings an immediate response and the result is that orders are entered with new people, sometimes at slight advances, on other occasions lower, depending on the market.

When the selling house formerly handling the goods finds his yarn in other hands, he begins to cut prices on the yarn that he holds, and besides unloading his own purchased stocks makes bids to outside mills who in turn are glad to have other outlets, and they consequently side-step from their old agents.

The above is simply an illustration, but is very suggestive of the present demoralized practice of putting yarn on the market. It is well known that there are few mills which are proof against offers from responsible dealers, and sometimes irresponsible ones, when the prices seem specially good, and it is an unpromising task for any agent to undertake the handling of the product of any mill that has previously been in the hands of several houses. A house may secure good premises, employ the best help, plan a perfect system and faithfully wait on the manufacturing trade, but nothing can successfully combat the well-supported cent-above the market offers made to the mills by competing houses, and the cent-below the market prices quoted to the trade on the same day both of which are the products of speculation. If the mill accepts these offers they shut out their agent; if they refuse them and insist that their agent approximate such levels, they in reality force him to hold the umbrella while the well-pleased competitor gets in out of the wet. These practices can be enlarged upon indefinitely, but the facts are well enough known to make it unnecessary.

We have free-lance mills to-day which are ready to quote anybody of good rating, commission house or consumer, and ready to make any kind of a contract for deliveries nearby or future at a price; some have sufficient money to wait for regular returns, while others want cash against documents. Some of these mills make good reliable merchandise and others can't keep anything uniform. The results are with the commission houses. We have commission houses which are trying to do a strictly commission business, but there are a larger number carrying regular merchandise accounts, which call their mills by number, pay all invoices in full at arranged dates and bill out everything as principals. Some yarn dealers are always ready to buy at a price, but always have something in stock to sell on the market. The past year has been full of glorious opportunities for such houses, and if they make one mistake at the end of the advance they have enough good plays ahead to strike a splendid average.

Now for recommendations: The writer favors direct selling wherever the mill has sufficient variety to serve several lines of manufacturing, and when it has sufficient capital to finance, say 60-day shipments. Taking into consideration the time of transit from Southern points and 30-day terms with some elasticity as to due dates, the period mentioned will be practically covered. Every textile manufacturer knows the advantage of being in direct touch with his spinner. His peculiar requirements are known to the mill, his deliveries assured, and any irregularities of manufacturing can be more quickly detected and adjusted than when working through a second or third agent. Such a spinner can employ a general broker on a low percentage cost. It must be expected, however, that such a broker necessarily represents the buyer more than the seller. His own trade connection is his capital, and strictly speaking when the order is accepted by the mill as to price, terms, deliveries, credit, etc., his brokerage is earned.

There is another kind of broker or direct agent who avoids conflicting lines, carries representation further on the spinners account, keeps an eye on the credits and collections, and gets his compensation only as the shipments are billed up each month. This sort of service costs more and is worth more. Some mills prefer to secure the entire services of one man and place their product exclusively with him. Such a representative may have other lines that do not interfere, and these as a result make his selling organization more efficient and influential. If a spinner does not feel able to finance his sales to the trade, let him select a commission house of unquestionable reliability and consign his goods as formerly, keeping in regular consultation, and directing when to sell freely or to restrict sales as conditions require. Let him put all of his confidence in this commission house, support its efforts by maintaining high-class outlets, furnishing yarn up to the standard samples, and putting down deliveries on time. Then I think the future with that connection will assure itself.

As a general principle, I believe that spindles should not be allowed to run ahead of looms or knitting frames. When there is no consumption of yarn, spinning should stop; otherwise the complications of stock in the market become a steady influence in depressing values. We can not look for correction of these trade abuses by conference, agreement or forfeits, but by an increasing sense of personal responsibility and moral stamina enough to back up a conclusion. The best hope lies in the fact that more conservative measures are a positive necessity as a guarantee of self-preservation.

Rosin is very frequently applied to prevent belt slipping, and this it will do, but at the same time it destroys the life of the belt itself. You get a temporary cure but greatly shorten the life of the belt—the rosin dries out the belt and makes brittle the leather fibers.

Cotton enters into the manufacture of more articles to-day than any other commodity except steel.

Cotton bags have displaced barrels to a great extent in the shipment of sugar, salt and flour.

The Conservation Movement in the South—What it Means to Southern Cotton Manufacturers.

(Contributed exclusively to COTTON.)

BY FRANCIS R. WELLER, C. E. ASSOC. M.AM. SOC. C. E.

To the Southern manufacturer, the subject of the conservation of national resources, might seem at first glance to be of little practical importance, and the problems of stream flow and forest preservation of only sentimental interest. The principle of conservation may be defined as the development and use of all natural resources in a way that will yield the greatest amount of good to the greatest number of people. We have seen this subject widely discussed in all of its different phases from time to time in the public press, and the people have begun to realize that conservation means far more in a material way to the future welfare of the country than any other public movement that has arisen in recent years. We have not the space here to speak of what has already been accomplished toward reducing the enormous waste which has accompanied the use of our natural resources; it is sufficient to say that the greater portion of the work is still before us, and it behooves every class of citizens to understand how the principles of conservation, directly affecting himself, can be carried out to be of the greatest practical benefit.

The South has an unusual combination of advantages over the other sections of the country; here are splendid rivers affording cheap power and transportation, a mild healthful climate, fertile lands, and untold undeveloped natural resources. With such advantages, it is not surprising that manufacturing has made such rapid strides during recent years, and especially is this true with respect to textile manufacturing. This growth is rapidly changing the old order of things, and a new South, alive to its possibilities and opportunities, has broadened the field of Southern industries.

Successful manufacturing is dependent upon an abundant supply of raw material, efficient labor, and cheap power and transportation. The raw cotton for Southern textile mills is at their doors, labor is plentiful, and is becoming more and more efficient. Railroad transportation, while still backward, is rapidly being extended and improved, while the splendid system of internal waterways is still but slightly developed, they will assure future cheap transportation when the needs of the South require it. The principal manufacturing industry of the South is the manufacture of cotton, but the power required, which is as important as the other factors mentioned, has gradually advanced in cost due to the increasing demands upon the fuel supply.

Just at the time when the coal shortage was beginning to be felt, electric power obtained from the development of water-power from the Southern rivers, came into practical use. The story of the rapid adoption of hydro-electric power in Southern cotton mills is in itself an interesting one. The use of such power, has in most cases, reduced the cost of power formerly obtained from the mill's own steam plant, and has enabled the mill to become independent of the coal mines and the railroad for maintaining the reliability of the power supply. Many will recall the coal famine during the winter season of 1905-06, when thousands of dollars were lost by the Southern cotton mills due to freight congestion lasting for some days.

At the present rate of increase in coal consumption, it is estimated that the supply of coal in sight will only last 50 years, and we must now look elsewhere for a source of power if our manufacturing interests are to be maintained.

FIG. 1. A BADLY WASHED HILLSIDE ON THE SOUTHERN APPALACHIAN.

Oil and natural gas are limited in their location and supply, so that the only dynamic force that can be relied upon as a substitute for steam is hydro-electric power. Every pound of coal that is burned under a boiler is that much energy forever lost, whereas the energy obtained from our streams, if the flow is properly conserved, is permanent.

All of the power streams of the South, east of the Mississippi River, have their source in the Appalachian Mountains, a region still covered by dense forests. It is an accepted fact that forests regulate stream flow; the destruction of forests invariably results in wide fluctuations in stream flow.

Ambassador Jusserand, of France, in an address before the National Rivers and Harbors Congress, in Washington, stated the principle of stream flow in these words: "No forests, no rivers," and carrying the idea still further, we may say, "no rivers, no power; no power, no manufactures." Inroads are being made into this forest region and show the effects of soil erosion in the Southern Appalachian Mountains. They are reproductions of photographs taken by the U. S. Forest Service. Figures 1 and 2 show the destruction of hillside lands by soil erosion. Figures 3 and 4 show the destruction of rich bottom land by freshets.

One serious feature of this soil erosion in recent years has been the rapid filling up of the large storage or regulating reservoirs. If some means are not taken to prevent this evil, the water-power of Southern streams will be materially reduced and the cost of power developments likewise increased. The writer has seen many acres of hillside lands completely destroyed by soil erosion, which with proper treatment, could have been preserved. Many of the Southern mills are located upon rivers, and in the past have experienced severe floods. While floods are not directly due to the destruction of the forests on the water-shed, still the severity of the floods are greatly increased by such destruction, permitting a rapid rate of runoff, and there-

FIG. 2. GULLIES IN A PASTURE FOUR MILES WEST OF FRANKLIN, MACON CO. N. C.

the destruction of timber is going on at a rapid rate. This continued destruction, if not checked, will result in a diminished stream flow, and therefore diminished water-power resources; but this is not the only evil of such deforestation. Prof. Shaler, in his outline of "Earth's History," has estimated that the Southern states, south of the Ohio and James Rivers, have more than 8,000 square miles of originally fertile ground which through neglect has been brought into a condition where it will not bear crops, and over 1,500 miles of the area have been so worn down to the subsoil or bedrock that it is doubtful whether it will ever be profitable again for agricultural purposes.

This destruction is largely due to deforestation. The rainfall striking the uncovered hillsides, rapidly erodes the soil, carrying it in suspension to the river, which in turn becomes choked and thereby destroys or diminishes its utility for navigation purposes. Figures 1, 2, 3 and 4 fore a sudden maximum discharge. These floods have caused in the past ten years a loss aggregating over two million dollars to Southern textile mills.

The disaster in South Carolina on the Pacolet River in 1903 resulted in the destruction of two large cotton mills and a large loss of life, which is still in the memory of the people. The flood at Augusta, Georgia, in August 1908, resulted in an estimated damage of over one-half million dollars. M. C. Leighton, chief hydrographer of the Geological Survey, estimates that during the Augusta flood above mentioned, there passed by and through the City of Augusta approximately sixty-two billion cubic feet of water in five days, and he states that "if the water so lost had been conserved in forests and reservoirs on the upper drainage area of the Savannah River, and released uniformly through the six months of the year during low water, the amount of water-power over the 44 ft. fall at Augusta

would have produced 145,000 additional horse power. All of this means a condition under which the entire flood could have been stored, but we know of course that all could not have been stored."

With the proper condition of forestation and available reservoir sites utilized, about 50 per cent. of this flood could have been withheld. Estimating the cost of development at $70 per horse power, the value of the water power at Augusta on this basis would have been increased $665,000 by the adoption of proper means for saving the flood water. This illustration will show the practical value of one phase of the conservation movement.

The Secretary of Agriculture, in a recent report, estimated the available water-power, based on a minimum flow for six high-water months without storage, to be 5,000,000 horse-power on the streams arising in the Appalachian Mountains, and of this amount, about one-tenth has already been developed. The duty of the South is to encourage the developmnt of this vast source of power in a way that will result in permanent benefit to all classes of citizens, for all are directly or indirectly affected by the proper use of such power.

Large hydro-electric power plants have been built, and others are in course of construction; transmission lines are rapidly being extended to different centers of the Southern textile industry. One water-power company alone is at present operating over 100 cotton mills and transmitting power nearly 200 miles from the source of its development. The manufacturer whose mill is located beyond the possible reach of hydro-electric power is indirectly benefited, for hydro-electric power has kept the price of coal down to within reasonable limits, has lessened the burden on South-

FIG. 3. BOTTOM LAND DESTROYED BY A SMALL STREAM NEAR OLDFORT, N. C., DURING THE FRESHET OF MAY 21, 1901.

ern railroads of carrying enormous quantities of coal required in manufacturing industries from the mines to the point of consumption, and thereby kept these highways of commerce free from congestion.

It is not necessary to speak in this article of the many advantages of hydro-electric power in cotton mills. The subject has been thoroughly discussed in many articles, but the writer's object has been to show some of the conditions which affect this rapidly growing development. We have read quite a little of late of a so-called "Water-power Trust" which seems to be threatening to absorb the last of the great natural resources still controlled by the people. Oil, coal, timber, have all been more or less absorbed by large interests, which control the output and fix the prices. It can be safely stated, that up to the present time, no such combination of Southern water-power companies has been accomplished. Large combinations are the result of present economic conditions and follow natural laws, which can not be disregarded. Such combinations should, however, be under proper control, so that the rights of the consumers will be safe-guarded. It is far more economical to distribute 10,000 horse-power from one power plant with 100 miles of transmission lines than to distribute the same

FIG. 4. CANE CREEK AT CLARISIA P. O., N. C., SHOWING 15 ACRES OF ALLUVIAL SOIL DESTROYED IN THE FRESHET OF MAY 21, 1901.

amount of power from 10 power plants of 1,000 horse-power each, with 10 miles of transmission lines from each plant. For these reasons power can be sold cheaper by the larger power companies, and therefore combinations of power plants are desirable, provided the consumer receives some of the benefit of the reduced cost of production.

As previously mentioned, practically 90 per cent. of the available water-power of the South is undeveloped, and protection against possible excessive power charges still remains with the mill owners themselves. The co-operative building and operation of power-plants is entirely feasible, and desirable in the event that a combination of water-power companies would attempt to unreasonably increase the cost of power. There are thousands of undeveloped horse power upon the smaller streams within reach of many cotton mills, which could be economically developed and operated for the benefit of nearly all mills. Public attention has been so attracted to the larger developments, that the power possibilities of the smaller streams have been overlooked.

The writer recently had occasion to investigate and report upon a number of small water-power projects of a few hundred horse-power each, and was greatly surprised to find that the cost per horse-power in these cases was so low. In the smaller developments a number of refinements necessary in the larger plants are eliminated, thereby helping to reduce the higher unit of cost of development of the smaller plants.

These statements should not be taken as encouraging any hostility toward the existing power companies, which are doing a large part in the work of developing Southern

manufacturing industries. These companies have expended a vast outlay of capital, and it is only right to expect a reasonable return upon this investment. The value of such enterprises is greatly enhanced by a co-operative spirit between the power companies and the consumer.

The conservation movement not only effects the future value of hydro-electric plants, but also the welfare of every citizen. There is at the present time a bill before Congress known as the "Appalachian Forest Reserve Bill," the purpose of this bill being the purchase of a section of the Appalachian forest area, by the Federal Government, to be set aside as a national forest reserve, and by so doing, reserve a future timber supply, and maintain the flow of Southern streams.

It is unfortunate that a large number of Southern congressmen have either failed to support this measure or have worked against it. Their action might be attributed to their inability to see indirect benefits that might arise to their constituency. Whether the congressman represents the cotton mill district of South Carolina or the fruit growing district of northern Florida, his people will share the benefits which this bill will confer upon the entire Southern people. The writer hopes that other articles bearing upon the importance of conservation of the soil, conservation of the forests, and conservation of mineral resources, as it affects the textile industries, will be written by men working in these fields, so that Southern textile manufacturers will fully appreciate the importance of the conservation of natural resources, and in appreciating, will give the movement their hearty and patriotic support.

The Southern Forest Question.

(*Contributed exclusively to* COTTON).

BY JOHN FINNEY, SECRETARY APPALACHIAN NATIONAL FOREST ASSOCIATION.

We, who believe that the South is "God's Country," feel that the belief is founded on more than mere sentiment. That there is a solid foundation for the old saying that an all-wise Providence has indeed blessed in abundant measure in climate, natural resources, streams, forests and mountains, in fertile lands, in its men and women, in a glorious past history, and in future aspirations and possibilities, this section of our nation. It is the new land of opportunity; the new field for human endeavor and national prosperity; its future is seemingly assured through the manifold agencies that are engaging its upbuilding and material betterment.

It is still "God's Country!"

Of the material things on which the South is building its present prosperity, its natural gifts must come first—the sure foundation for profit and advancement lies in its climate, coal and iron, its fertile soil, abundant water courses, splendid water powers, and noble forests—and all of these things depend on the forests to a larger extent than most people realize. It is therefore intended to present briefly some fundamental facts on the forest question in the hope that the seeming ignorance and indifference in the South on this topic may be changed into a viewpoint that will enable us to use some degree of effective effort in solving the serious problems that our present misuse of the forest has brought face to face with us.

THE SOUTH'S ORIGINAL FOREST AREA.

Of the five great original forest types existing in the nation the South contains all of one, the "Southern," the largest part of the second, the "Central," and a large portion of a third, the "Northern." The Southern type stretching southward from New Jersey covered all of Virginia, North and South Carolina, Georgia and Florida, most of Alabama, Mississippi and Louisiana, with large portions in Texas, Arkansas, Oklahoma and Missouri; it was a coniferous forest with the yellow pine predominating.

The Northern forest extending from New England through New York, Pennsylvania, along the Great Lakes to the western portion of Minnesota, had an extension southward along the Appalachian range to the northern portion of Alabama and adjoining States; like the Southern this was also a coniferous forest in which the white pine predominated.

In the Central forest which covered all of Tennessee, Kentucky, the slopes and foothills of the mountain ranges and covering extensive portions of the Gulf States, Texas, Oklahoma, Arkansas and Missouri, there existed the only forest area in the United States in which hard woods predominated and these grew in extreme abundance and great variety.

These three forest types covered an area in the South of about 400 million acres and contained perhaps 2,500 billion feet of standing timber.

THE SOUTH'S PRESENT FOREST AREA.

The present bounds of the original forests in the South are practically the same as originally, except that both the original areas and their contents have been greatly reduced by cutting, clearing and fires; so we find that while starting with an original forest area in the nation of 850 miles acres and a stand of 5,200 billion feet, we have remaining to-day as the total timber supply of the nation not over 550 million acres with a total stand of about 7,500 billion feet. The South contains, as nearly as it can be estimated, 234 million acres of forest lands and a stand of perhaps 600 or 700 billion feet. Over 40 per cent. of what remains in the nation, both as to area and quantity, lies in the South!

Not only does the South contain so large a percentage of both forest area and stand, but the latter comprises by far the most valuable species of timber growing in the nation, for the South has all of the yellow pine, cypress, all the naval stores industry, and almost all of the hardwood. In regard to the latter it is significant that the Southern Appalachian region is the natural home of the hardwoods, and practically the only remaining source of supply for the many valuable and indispensable species, so classified. It is to the South that the nation must look for its future supply in these varieties.

SOUTHERN FOREST OWNERSHIP.

Forest holdings in the South may be roughly divided into two classes: (1) farmers' woodlots thought to aggregate about 110 millions acres, and (2) corporate and independent holdings, aggregating about 125 million acres.

The farmers woodlots consist mainly of small holdings, usually scattered and detached remnants of the virgin forests, valuable chiefly for protection and ornamental purposes. They are almost invariably cut-over or burned-over areas, and while containing much valuable timber and used as a supply for cordwood, posts, rails, cross-ties, etc., they are fortunately not capable of being used as the basis for extensive lumbering operations.

The corporate or individual holdings are usually in extensive tracts, and frequently are in very large areas; they quite naturally contain by far the most important stands of timber. These tracts are either the basis for extensive lumber cutting and manufacture, or are held for future cutting or sale, and it is significant to note that considerably over one-half of this vast area is held by other than Southern men and Southern capital. In other words capital has been attracted by the opportunity offered to buy timber and timber lands at very low prices, and has largely embraced the chance for profitable exploitation which the Southern forest has presented. This has been perhaps inevitable, but the fact remains that by far the largest portion of the South's wealth in timber is in the hands of men whose only motive is to cut it at a profit as rapidly as skill and brains and money can do it, regardless of what it means to the South.

WHAT THE SOUTH FACES IN FOREST NEGLECT.

We do some things well in the South, but we have handled our forest wealth and endowment very badly. The possession of forest areas is what makes a fair land, for with forests come rainfall in generous measure, well watered valleys and fertile lands, noble streams useful for water-power and navigation, good climate, a vigorous and right-thinking people, all of which the South has because it has the forest.

The reverse of this picture is shown in deforested China, Syria, Palestine, Persia, and other formerly great nations that have built up great civilizations, and have gone down to decay largely because of misuse of their forests. One does not need to go to ancient lands, or foreign climes to obtain the proof of this statement, for in our own Southland there are areas scattered over the whole South, ever widening and growing as the forests are destroyed, that rival in desolation and in pitiful ruin and waste anything that China can show. Vast thousands of acres which once supported noble forests are now so burned and eroded and furrowed that nothing is growing, and nothing can again grow of itself throughout all time to come.

WHAT MUST BE DONE BY THE SOUTH.

To those of us who love the present fair and smiling Southland and believe in and are working for its splendid future, there must come some conception of a duty laid upon every man in the South as regards this forest matter, a duty which can not be evaded or passed along to posterity. This duty involves equal responsibility on the nation, the State, and the individual for simultaneous and co-ordinate co-operation. Such a movement would mean that the nation would extend the areas of the present national forest, now wholly located in the West, to include similar national forest areas in the East wherever they may be constitutionally established at the headwaters of important navigable rivers throughout the entire East and South.

When this is accomplished, and it can be brought about through Southern votes in Congress, we shall have national forests as "demonstration tree farms" or object lessons in tree culture and proper use of forest products, in the Southern Appalachians and White Mountains and similar areas, and shall have secured national leadership in true timber conservation and perpetuation. This would at once pointedly show the States their duty, for with only 5 million acres in the South in such national care, there would remain in the South 230 million acres which must be similarly conserved, and this can only be done by and in the States themselves.

The State duty involves State forests as "demonstration tree farms," scattered throughout the several States under the skilled care of foresters; it involves a radical change in taxation on forest lands, so that growing timber be not taxed, but taxes be levied rather on forest products when cut. It further involves that stringent fire laws in each State be strictly enforced through efficient State officers. It involves State regulation and supervision of individually owned forest lands that would make possible individual co-operation willingly or per force.

The individual duty under these conditions becomes self-evident; it would insure a willing co-operation in a just and equitable plan of forest perpetuation, but one that could not be carried out without some individual sacrifices perhaps, not without some radical laws and change of opinion regarding vested rights, and not without a taste of a sharp lumber famine extending over some years.

The whole intricate problem can be solved when once the South throws off its indifference and begins to act. But without some active start towards the actual doing of these necessary things, the whole splendid forest area lies in imminent danger, and faces total destruction within the next 15 or 20 years. With an annual cut of three and one-half times the annual growth in all the forest, with a tremendous drain from fire, turpentining, insects and wind damage, we shall live to see the time, unless sentiment changes and something be done, when there is no forest question to solve, save only as difficult and costly problems of reforestation of barren lands arise, and are carried on for the dreary years while trees are growing to maturity.

Some of the specific things we can immediately do are these:

(1). We can get the Appalachian forest when the South insists that its representatives in Congress shall vote and work for it.

(2). We can get State forests and proper State laws when the Southern States shall elect men pledged to establish them.

(3). We can, without doing either of the above, individually rise to a proper conception of the individual duty, and work in the State and the nation for forest conservation—we can practice what we preach by using our own forested area in a proper and careful way as stewards for posterity, and this stewardship lies against the owner of woodlots and the owner of vast tracts in equal measure.

We must realize that this forest question demands immediate attention, if national calamity is to be avoided, and that the situation demands the active co-operation of every patriotic Southern man and woman.

Thousands of bales annually are required to make cotton duck to place around the asbestos sectional covering in which the steam hot water pipes of fireproof buildings are encased.

A Federal Cotton Experiment Station.

(Contributed exclusively to COTTON.)

BY J. N. INGRAM.

Cotton is king in the industrial world, a ruler in commerce, and a factor in manufactures. Its production employs more men and enlists more capital than any American product. It clothes half the world, supplies the mills of many nations, and is a leading American export. An industry of such magnitude should enlist the governing powers in promotion of its welfare. A commodity of such value and a chief staple in national commerce, should claim attention from those entrusted with its destiny, that its future may be safeguarded and its interests protected; that its production keep pace with public demands; its quality be improved and output enlarged. Injury to such a product should excite general solicitude, and its growth and improvement receive national encouragement. As the world increases, cotton necessities will increase, factories will multiply, and markets will enlarge.

The world will continue year by year to want more cotton. New uses for the fiber will be found, and finer grades demanded. The future will call for enlarged cotton supplies, and improved qualities. America will always be the productive home of cotton; its fields will continue to furnish the world's spindles and looms, and other requirements. Southern soil and climate will continue to produce the popular grades, and give the market its bulk of lint. Half of our national domain will always be a cotton producing country, and we shall continue to lead the world in the growth of the fleecy staple. Cotton will always be one of our chief products, form one of our principal exports, and sustain textile manufacturing. It therefore behooves our Federal Department of Agriculture to bestir its energies and exert its resources in developing the best processes of cotton culture and fertilization, and educating producers in the selection of the varieties best suited to Southern climate and soil, adapted to the world's present wants and future necessities.

A general Federal experiment station should be located and operated in the center of the cotton growing region, with branch stations in adjacent cotton producing localities, where, with sufficient revenue, expert specialists and necessary arrangements, the methods of cotton culture, tests of fertilization, selection of cotton varieties and development of various and high grades of lint in market demand, can be demonstrated. With full equipment, careful study, close observation, thorough investigation and systematic records, such processes of experiment and development can be accomplished, preserved, published and made public. Under such auspices the important and varied responsibilities of cotton culture, development and experimental selection, can be executed by efficient agents, under official supervision. The different varieties grown in the various countries of the world, on both sides of the globe, north and south of the equatorial line, can be tested. Egyptian and East Indian cotton can be contrasted, Peruvian and Mexican lint compared; Chinese and Central American staple placed in competiton; and African, Australian and other varieties given a chance to show their qualities and capabilities on American soil, under American conditions and cultivation. Our own favorite varieties can in the same enclosure, under similar processes, be put to the test, and contrasted with results from foreign varieties.

That discoveries and improvements would follow such experiments would be natural. That improved lint varieties would be developed, and advance made in cotton production, would also be natural. Varieties imported from beyond the sea might be grown in Southern fields; and lint qualities desired abroad, supplied from Dixie gins. Foreign varieties might be naturalized on our soil, and possibly improved in our varied climate. In our extended territory and gradations of temperature from southern Florida to the Virginia line, more cotton varieties will grow; and other kinds may be acclimated. Importing cotton from foreign countries may be made unnecessary, and our own fields brought to yield all the grades and qualities that our manufacturing necessities require.

America imported in 1907, 114,306,537 pounds, or 227,793 bales of raw cotton; 26,060 bales of foreign lint was reexported; 202,733 bales of foreign cotton were wanted, and used by American mills. Egypt sent us 169,122 bales. Peru supplied us with 7,619 bales; the United Kingdom furnished 19,726 bales; other countries forwarded 33,326 bales. Egyptian and Peruvian cottons are extensively used in the American manufacture of knit goods and thread, and for a substitute in woolen goods manufacture. Cotton that bleaches in American dews, should be developed equal in quality to that which whitens under Africa's sun, and beneath Peruvian skies. A high class cotton experiment station, judiciously located and efficiently conducted, should and doubtless would accomplish such results. Our land diversity, territorial extent, and climatic variety should produce all the lengths, strengths and characters of fiber that we consume. The ships that bring us alien lint should sail back with the same character of commodity from our own ports. Doubtless somes oil analysis, temperature, adaptation, climatic study, seed selection, and required cultivation will attain such results. Tests in different States on our various soils, of many elevations over our 700,000 square miles of cotton producing area, will at no distant day show amongst our home cotton, things new in culture and lint production. The improvement of our American cotton and an increase in yield by seed selection can be fully illustrated and taught by cotton experiment station bulletins.

Study of insect extermination, and of blight and plant diseases that destroy cotton, reduce its production and damage its quality, can be best carried on at well equipped experiment stations supplied with all the scientific devices and chemical discoveries of later days. Myriads of other insects besides boll weevils may assail our fields and lay waste to our cotton, and other blights attack our chief staple. To check their advance, combat their ravages and exterminate their increase, call for ample equipment, full preparation and well directed efforts of a Federal agricultural guardian employed to watch our plant interests and protect crop production.

Boll weevils now devour approximately $20,000,000 worth of lint annually in Texas; they have invaded other States, crossed the Mississippi and headed toward the Po-

tomac River. Other plagues may lay in wait along the Rio Grande. The lands of Mexico may breed additional scourges. The malarial flats of Central America generate other ravages and send us more lint destroying plagues to desolate our fields and blight our farms. Invidious hosts from other countries may also arrive and join in cotton destruction. From reigning as the world's great cotton producer and exporter, America may become a great cotton importer; other industries may occupy and other products grow in our cotton producing region. Development of other enterprises have had ample national provision for protection, expansion and improvement of grain culture, fruit and vinticulture and other agricultural, horticultural and citral industries, as well as cattle and stock breeding, have had liberal gifts from the national government to promote their success, develop their qualities and guard their interests.

Sugar cane and beet culture, tobacco, rice, truck and coffee production have been allotted national experiemnt stations with dairies for raising sheep, and for stock breeding. Large donations are yearly made for detection and alleviation of stock fevers and vermin; cattle quarantines are sustained, inspectors are employed, and regulations enforced. Vast expenditures are annually made for land reclamation, irrigation works, and desert development in the far West. Geological explorations receive millions more. Volcanic catastrophes are given a million. War fleet circumnavigation absorb other millions. The Agricultural Department consumes ten millions. The Republic is not poor, nor is its treasury empty or credit questioned.

A reasonable allowance should be made to cope with cotton destroying blights, and extirpate insect enemies that threaten a national industry, and the supply of a world demanded staple in order that the earth's people may be clad, its factories operated, its labor employed, and commerce maintained. The Federal experiment stations have already been established in many States throughout the nation, for testing best methods and developing processes for other crops. Discoveries there made by expert investigation have been useful and valuable. Improvements perfected by experimental effort were profitable; industries were advanced, values increased, production enlarged, and the people educated in the science of selection, cultivation, and plant development; agriculture was stimulated, the people enriched, and the nation benefited.

(To be continued.)

Welfare Work: An Illustration.

(*Contributed exclusively to* COTTON.)

BY A. M. C.

Welfare Work is a very familiar term nowadays, and its practice in the various factories and villages is indicative of a progress that will mean blessings to future generations. An analysis of the term gives the many ways that are being taken to improve the moral, physical and spiritual condition of workers. The Southern cotton mills and villages offer the most fruitful fields for just such work as this, probably more than any other section of industry. The degree of success that the movement has attained, constitutes as genuine progress as any of the industrial types of advancement that are daily in evidence about us.

The work of providing sanitary buildings, pure drinking water, proper lighting, wash rooms and lockers, shower baths, emergency hospital equipment, and any number of conveniences for the benefit of the workers, is one of the important phases of welfare work. However, the movement has been planned on such a liberal and comprehensive basis, that the work extends beyond the walls of the factory and sends a healthful influence to the home life of the workers, making his leisure hours for recreation, education and spiritual improvement of the greatest possible benefit and pleasure to him.

Enlightened self-interest, in itself, will cause the introduction of such welfare work. Many of the Southern cotton mills are carrying on the work to a certain extent, according as the managements feel in a position for the mills to undertake the work, but few have attained the prominence and success that the Monaghan Mills, of Greenville, S. C., have. This success is due to the untiring efforts of its president, Thos. F. Parker, who may be termed the pioneer of the movement in the Southern field.

The Monaghan mill village is located just outside of the thriving town of Greenville, S. C., and has an elevation of about 1,000 feet. The village is situated at the foot of the mountains belonging to the Appalachian system, which affords an ideal climate with cool nights in the summer, and pure water and air. These are important considerations for people who work hard at the mill during the day. The selection of the location for the cotton mill and village was made with the view of selecting the best possible conditions in every respect, and nothing was omitted in establishing the plant that would serve to attract operatives who value homes and good working conditions. As a result of this foresight in making such an excellent selection, these mills have acquired a reputation for having the best class of mill operatives in the South. They are intelligent and respectable, and are pursuing a very wise policy of saving money and buying homes for themselves.

RECEPTION ROOM, Y. M. C. A. BUILDING.

The liberal policy of the mill toward its operatives is shown very forcibly by the fact that the Monaghan mills have never been sued by any of their employees. It can be safely said that the operatives in these mills are as well contented with their work and homes, and are as loyal and attached to the management as any other mill village population in the South. When Thos. F. Parker, president of the mill, assumed charge of the company in 1904, the conditions found there were very similar to those too often found in other mill villages—forlorn looking rows of houses, a more or less sullen atmosphere among the working people, and very few social activities. Many of the operatives were

MONAGHAN MILL BRASS BAND.

constantly moving in and out; it was a very transient population. A systematic effort of the management has been instrumental in bringing about a remarkable change in this previous state of affairs, so that now with the attractiveness of the village and the institution of social activities, the people have no desire to move to other mills. As a consequence they become more skillful in their work at the mill and are of more value to their employers and themselves. The concrete result of this condition is shown in the excellent quality of the goods produced.

The first impression of a person visiting this mill is that of cleanliness and order on every hand; the sides of the mill and warehouses are covered with vines, and all in front of the mill during the summer is a long bed of flowers, with well-kept lawns at the sides of the paths.

The village has a population of about 2,000 inhabitants and in nearly every yard there are vegetable and flower gardens. The mill management offers prizes every year for the handsomest yards, and this practice has served to arouse a great deal of interest in this work among the operatives. All the streets are well shaded with trees, such as elms, maples, sycamores and oaks, all of which give the village a tone that only systematic work of this nature can secure. The mill company also provides pastures and proper sheds for the cows belonging to the operatives. So much for the civic pride of the community which the management has fostered.

As to the welfare work among the people, many phases are in operation in the village, all of which tend to make better men and women, and help them to enjoy life day by day. Mr. Parker, who formulated the plans, has provided a school with teachers who have been carefully trained with a view to this special work, and the classes are so divided that not more than 40 pupils are in one class. The teachers live in the mill village and one of their duties is to visit regularly in the homes of the villagers and to teach in the Sunday-school.

A kindergarten has also been established, as well as cooking and sewing classes for girls, and attendance is made compulsory. A class in manual training has also been introduced for the benefit of young boys. The building is also provided with shower baths, and school girls are strongly influenced to take advantage of them. When such a finely-equipped building is compared to the ordinary country school or church as they have existed in this section previously, the tremendous advantages and efficiency in this work can be readily appreciated.

There are two religious denominations in the village, the ministers being furnished with houses free of charge, and a substantial contribution to their salaries paid by the management. The only condition for these benefits is that these ministers live in the village and give at least one-half of their time to the work there. A branch of the Y. W. C. A. has been established in the village with a general secretary, a teacher of sewing, cooking, etc., for the women. This association has been very successful and has grown to be the center of the women's social life in the village. Here the women and girls have their meeting rooms, pianos, large library, baths, gymnasium, etc. In the same building, there are held afternoon and night classes in reading, spelling, writing, and arithmetic; gymnasium classes and basket-ball, as well as cooking, sewing, and house-keeping classes.

A Y. M. C. A. has also been established with a club house under the management of a salaried Y. M. C. A. secretary. The club house cost nearly $20,000, and contains a fine gymnasium, running track, bowling alleys, and rooms containing shuffle boards, pool tables, library of 1,000 volumes, bath, and locker rooms, etc. Twenty different amusement clubs have been formed, such as a shooting club, rambler club, camera club, etc. Night classes have been formed for men and boys, where reading, spelling, arithmetic, writing, and textile studies are taught.

One of the latest additions to the corp of welfare workers is a trained nurse who lives in the village and has an office and operating room. She spends all of her time help-

CLASS IN WOOD WORKING.

ing those who are sick and injured. The little children are also given special attention and it is very natural that they are very devoted to their friend who spends much of her time looking after their welfare.

The Monaghan mills have the distinction of being the only mill in the country that publishes a newspaper regularly for its operatives. The "Monaghan" has four pages and is published every two weeks. The columns are devoted entirely to reading matter and are always filled with live mill news. The village has a splendid band and always puts out a good base-ball team in season. In speaking of the results obtained, Mr. Parker said: "We have found that our welfare work is bringing about more and more a strong and lasting influence among the operatives and is attracting and producing a better class of labor, and therefore a more cordial relationship between the operatives and the mill management."

Humidity in Cotton Mills.

(*Contributed exclusively to* COTTON).

BY JOHN W. FRIES, INVENTOR OF THE HYGROSSO, WINSTON-SALEM, N. C.

The most effective argument for the use of humidifiers in cotton mills has been that they secure increased production and a better product; but an equally good argument is that they conduce to the comfort and health of the operatives. This phase was commented upon by the late Sir Benjamin Dobson who was an authority on the subject of humidity in textile mills. Observations were taken under his direction, the results of which led him to the conclusion that the death rate in textile centers, where artificial humidity was used was less than in the districts containing no such equipment. Although complete saturation of the atmosphere in a room is detrimental to the health, yet if the air is properly moistened, such as is required in a cotton mill in order to successfully manipulate the stock and weave the cloth, it will always be found healthier than a hot, dry air, holding dust, flyings, and other impurities.

Cotton, however, is almost pure cellulose, and there is nothing harmful in the dust and lint of cotton in itself; but it is also true that a dry atmsophere, charged with floating particles of cotton, does dry up the mucous membranes of the nose, and throat, and lungs. Nature has provided these membranes with secretions which not only keep the membranes soft and tough, but in connection with the fine hairs, or cilia which line the nose, these secretions catch or sift out the dust from the air we breathe. This is especially true of fibrous dust, as against mineral or metallic dust. When these secretions are deficient, or if they are dried up by an excessively dry atmosphere, dust may find its way into the lungs, and may clog up the minute air passages.

When the mucous membranes become dry and parched, they are liable to crack, and thus prepare the way for dangerous germs, especially those of consumption and pneumonia, to enter the system. Again dust particles which become lodged in the lungs may set up inflammation and thus weaken the tissues and make these portions more susceptible to disease. These germs can not get into the system through a normal health membrane.

The idea that pulmonary diseases are dust borne is so widely spread, that the U. S. Department of Commerce and Labor has lately devoted two bulletins—Nos. 79 and 82—to this subject, and it seems to have demonstrated that mineral and metallic dusts and municipal dusts are decidedly "health injurious;" but we can not accept all of the author's conclusions, as to cotton dust. The cotton industry is discussed in Bulletin No. 79 as one of the dusty trades, and we find it stated that "the vital statistics of 1890 included 1,080 deaths of male textile factory operatives, and of this number 15.4 per cent. had attained to ages of 65 or over. The consumption death rate was 2.27 per 1,000 or below the general average.

"The vital statistics of the census of 1900 included 1,332 deaths of male textile operatives from all causes, and of this number 17.4 per cent. had attained to ages of 65 or over. The death rates generally were below the average for males employed in manufacturing and mechanical industries, except at ages of 65 or over. Out of the 1,332 deaths from all causes, 23.5 per cent. were from consumption. The corresponding death rate was 2.08 per 1,000 against 2.62 for the whole manufacturing and mechanical class. The death rate from the respiratory diseases was 1.07 per 1,000 for textile factory operatives, against 1.81 for the manufacturing and mechanical industry class, so that both consumption and other respiratory diseases the recorded mortality indicates a lesser liability than is met with among occupied males in more or less similar employments."

These census figures do not sustain Mr. Hoffman's theory that all dust is injurious, so that he goes on to say, "these statistics, however, can not be accepted as entirely accurate and conclusive, and they are here included only to call attention to the necessity of extreme caution in accepting the vital statistics of certain occupations, etc." One must admit that throughout the Bulletin, he is eminently fair in his quotations from all available authorities, but some of his conclusions seem to be strained to support the proposition that the dust-laden atmosphere of factories and workshops is always and necessarily "a decidedly serious menace to health and life." The Bulletin further states that "Weaving is a more arduous occupation than spinning, but apparently the health conditions affecting this employment are more favorable than the corresponding conditions in the spinning room. Spinning attracts the less physically strong or those who, because of their frail physique, would be predisposed to consumption. This, in part, no doubt, accounts for the difference in the mortality rates in the two employments." But even weaving is not "arduous" in comparison with many other industries, and the cotton mill industry as a whole may be said to attract persons of "frail physique," for the simple reason that it is light work. It is hardly fair, therefore, to compare the mortuary statistics of the cotton industry with what may be called selected classes of robust, adult male like carpenters, tanners, etc., without making similar allowance for differences in physique here also.

Bulletin No. 82 discusses, "Occupations with exposure

to municipal dust, and occupations with exposure to general organic dust." The author concludes that "a comparison of the general death rates of millers, bakers and confectioners, cigar makers, tobacco workers, leather makers, leather workers and boot and shoe makers shows a favorable general mortality experienced at all ages, as against the corresponding death rates of occupied males generally. Thus the rate per 1,000 in these occupations, from all causes was 12.61 against 15.16 for all occupied males. The rate from consumption was 2.28 against 2.37; and the rate from respiratory diseases was 1.71 against 1.97.

The very close correspondence between these figures and the census returns on cotton mills quoted above would surely justify placing all of these industries in one group, and we can then accept Mr. Hoffman's final conclusions, "that the effects of exposure to organic dust are less serious than the corresponding effects of exposure to metallic and mineral dusts, but the consequences to health and life are sufficiently serious to demand the most careful attention to the whole problem of dust prevention and removal at the point of origin, in conformity to modern methods of factory sanitation."

But after we have done our best in the way of "dust prevention and removal at the point of origin," as at the pickers and card grinders, etc., there remains a large amount which can not thus be removed, because there is a point of origin almost everywhere in the mill. Some sanitarians say that this dusty air should be removed bodily and be replaced by fresh air, and that this should be done all the time; but mill men know this is possible only in new mills and then at heavy cost for construction and operation. And where are we to get the fresh air? Doubtless there is plenty of it at isolated country mills, but in cities and even towns the municipal dust is worse than the factory dust.

The only course then, that is practicable generally, is to lay the dust by humidification. One need not go to a cotton mill to see that humidification will do this. It is a matter of common observation that in very dry weather the whole atmosphere is hazy with dust; that a shower will clear away this haziness; even a shower is not necessary, for cloudy weather with a rise in humidity, and no actual precipitation, will do it. To sum up briefly, there are three convincing arguments on this line for humidification in mills; (1) there will be less dust made; (2) what dust is made will settle; (3), the operatives will inhale less of the dust that is made, because the secretions of the mucous membranes are not dried up.

But even if we admit that textile work is a dusty trade, that all dust is injurious, and that consumption and other lung diseases cause the death of too many operatives; it seems to me that the real cause of this mortality is to be found outside of the mill rather than inside, and that in most cases it is due to imprudence of the operatives. The conditions in the mill may be ideal, as regards light, air space, heating, ventilation and humidification—and we may safely claim that the modern cotton mill approaches the ideal in construction and management more nearly than even the average school-house—and certainly more nearly than most other industries; and yet, ideal conditions in the mill are no safeguard against imprudence, and "health-injurious" conditions outside of the mill. It may even be that the more we improve conditions in the mill, the more the operatives become susceptible to adverse influences outside of its walls. Perennial plants thrive in the open under all the changes of the seasons, but if one of these same plants is raised under the ideal conditions of a conservatory, and then suddenly transplanted outdoors in midsummer or midwinter, it will probably die.

Mill operatives show the very extreme of thoughtlessness and imprudene in the way they transplant themselves from the conservatory conditions of a good mill to all sorts of outside weather. When the whistle blows at noon, or at night, there is a rush from the doors into broiling sunshine, or pouring rain, or driving snow, without any thought about protection against the weather. Some of our factory girls spend a good proportion of their earnings on Sunday clothes to which of course there is no objection, except that they never think of umbrellas or overshoes on work days. And we can not expect any more prudence from the operatives when the superintendents and overseers are practically as careless in this respect. Almost any day one may see an overseer without hat or coat, and regardless of the weather, going from the mill to the office.

It must be expected that mill operatives are more or less ignorant of hygiene, and a sanitarian would find a great deal that he could call "health-injurious" in their habits and life in their homes. I venture to say that he would find the comparison eminently favorable to the mill and much more favorable than the proportion of 60 hours per week in the mill to the 108 hours per week outside of the mill. This argument does not excuse any mill man from doing what he can for the comfort and health of his people, but neither can the sanitarian be excused if he does not study the whole 168 hours per week in the life of his subject. If popular education and the care of public health be proper functions of government, it is highly desirable that the work be organized on much broader lines.

OBITUARY.

Alfred M. Goodale of the firm of A. M. Goodale & Co., Boston, Mass., died at the Waltham Hospital, Waltham, Mass., on December 18, 1909, following an operation for stomach trouble, performed several days previously. He was a cotton yarn broker, and was 53 years old at the time of his death. He was born in Saco, Maine.

He received his early education in the public schools in Saco, afterwards entering Maine State College at Orono, now University of Maine, where he received his degree in 1875. He then served an apprenticeship in the Saco & Pettee Machine Shops, at Saco. In 1880, Mr. Goodale became superintendent of the Newton Mills, Newton, Mass.; leaving there in 1883 to become agent of the Hamilton Woolen Co., Amesbury, Mass. The following ten years, 1884-1894, Mr. Goodale was agent of the Boston Mfg. Co., Waltham, Mass., and from 1894 to the time of his death, treasurer of that company.

In 1901 he established the firm of A. M. Goodale & Co., cloth and yarn brokers in Boston, Mass., and since that time has been the leading factor in this firm. In 1895 he was president of the New England Cotton Manufacturers' Association, now the National Association of Cotton Manufacturers. In the city of Waltham where he made his home for many years, he was honored as trustee of the Waltham Hospital, chairman of the Sinking Fund Commission in 1890, and chairman of the Board of License Commissioners in 1894.

The A. French Textile School of the Georgia School of Technology.

WM. N. RANDLE, DIRECTOR.

This school gave the first instruction in textile education south of Mason and Dixon line in February, 1899. The end of the first decade finds it well past the experimental stage, proceeding along well defined lines with the various phases of its curricula appreciated and fully recognized by cotton manufacturers and the public in general.

This textile school was established in response to the demand for instruction in the arts and sciences directly applicable to the cotton industry. The scope was broadened to include the very highest grades of yarns and fabrics, to exhibit the possibilities of native resources as well as to give a thorough technical training along textile lines. The practical results of the well-rounded course are well illustrated by the positions of trust and responsibility occupied by the alumni, by the numerous requests for their services, and by the increasing number of new students attracted by the successful careers of former students.

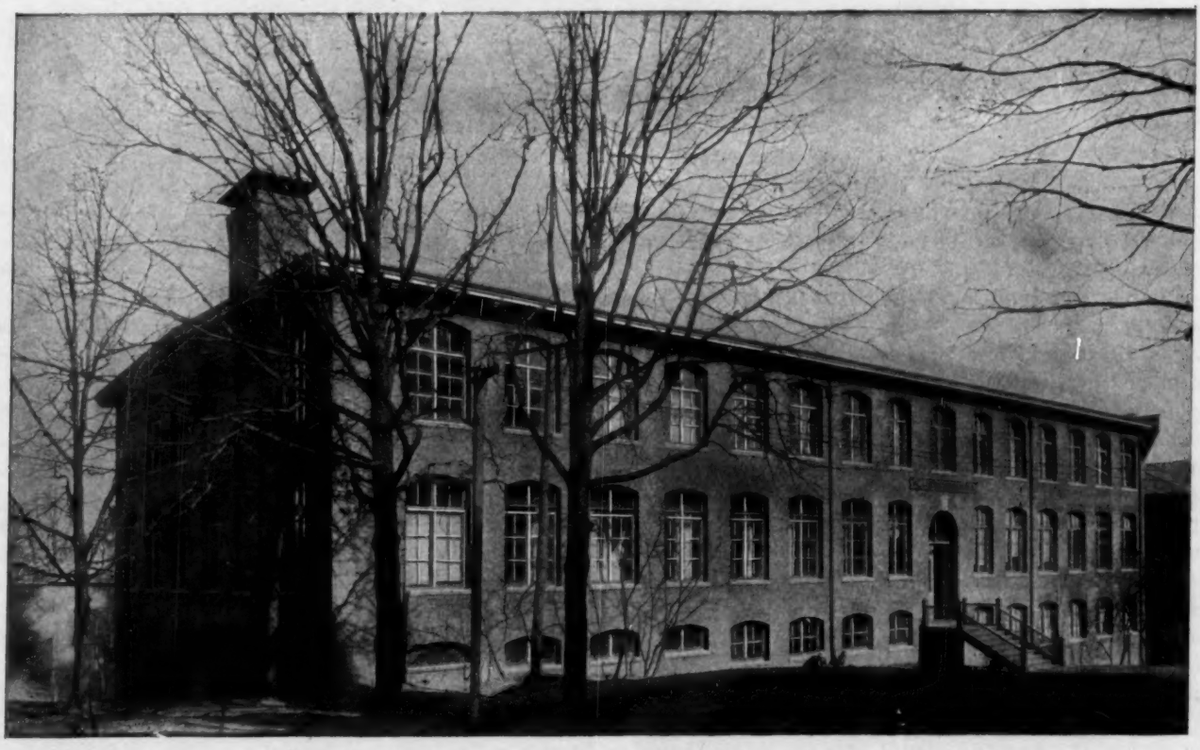


FIG. 1. MILL BUILDING OF THE A. FRENCH TEXTILE SCHOOL.

This school now offers unexcelled advantages to the young man of energy and thrift who intends entering the textile industry, being magnificently equipped for performing every process and operation of cotton manipulation from the cotton field to finished fabrics, and having admirably arranged class rooms, laboratories, etc. for giving practical instruction in the sciences and the application of this knowledge along industrial lines.

FOUR-YEAR COURSE.

The course combines lecture room theory with laboratory practice in a very comprehensive manner. The students are trained to be accurate and systematic in planning their work, and to observe closely the results in its mechanical execution. A large amount of practical work is given, enabling the student to familiarize himself with all details in the design, construction and operation of the several types of the various machines.

Fabric structure is taught throughout the Sophomore and Junior years in connection with fabric design and fabric analysis. The student is lead by nicely graduated steps from the elementary principles of fabric structure to the preparation and execution of designs for the most intricate forms of woven ornament. Fabric design begins with the Sophomore year and extends through the first term Junior.

Fabric analysis follows in the second term of the Junior year. Instruction is given in the various yarn standards and calculations leading up to and preparatory to, analysis. The student is provided with specimens of yarns for the determination of such details as breaking strength, count, twists, material, and cost of spinning. Similar and more advanced work in the practical analysis of cloths of different character renders him familiar with the most modern system for ascertaining the exact construction of existing fabrics and the cost of their duplication.

JACQUARD DESIGN. The instruction relating to the Jacquard machine extends through the Senior year, covers the entire range of Jacquard work, and is made as practical as is consistent with best results. After first understand-

ing the principles and limitations of the machines, tie and loom, the student selects his figures, prepares the sketch, makes a design, stamps the cards, laces them and weaves the fabric. Each student is required to complete several designs for such fabrics as damasks, upholsteries, dress goods, vestings, curtains, towelings, lap-robes, hangings, furniture covers, etc. Originality is encouraged and every opportunity is given for the development of artistic talent.

The mechanical equipment of the school is second to none. The machines are, for the greater part, full mill size operated as nearly as possible to full capacity, and affording every opportunity for giving instruction in the many processes and operations of cotton spinning.

FIG. 2. VIEW IN THE CARD ROOM, A. FRENCH TEXTILE SCHOOL.

CARDING AND SPINNING. The instruction in carding and spinning consists of illustrated lectures, recitations from technical text-books, machine demonstration, and a large amount of practical work in operating, dismantling, erecting and repairing the machinery comprising the department's equipment. Practical work in the operation and care of the equipment begins with the Freshman year and continues throughout the course. Experience has demonstrated the wisdom of first acquainting the student with the mechanical operation of the various machines in order that recitations and lectures pertaining to them may be more readily and thoroughly understood. To this feature, the success of the school and that of its alumni is largely due. The former oft-repeated criticism that textile graduates "are all theory and of no practical value" has never applied to this institution. The actual manufacture of yarns for the supply of our own looms is continuous, with an additional surplus sold to nearby mills.

Especial attention is devoted to card clothing and grinding, card and roller setting, comber settings, leveling, erecting, etc. The Junior lectures and recitations include the study of the cotton fiber, its ginning, packing, sampling, grading and commercial handling. This is followed by an exhaustive study of the various machines used in common yarn manufacture, such as bale breakers, mixers, pickers, cards, drawing and fly frames, and ring spinning. The student is thoroughly drilled in all the calculations, settings, etc. pertaining to carding and spinning. In the Senior year the work is extended to include combing, mule spinning, spooling, twisting, reeling, cone winding, gassing, packing, etc. During the second term mill planning, lay-outs, costs, humidity, special problems and commercial features of the spinning trade are considered.

WEAVING. The instruction in weaving and related branches begins with the Freshman year. Each student is required to become proficient in plain weaving before taking up more advaneed work. During the second term he is given practice in warping, slashing, drawing-in, reeding, and starting up warps on plain power looms.

The Sophomore year is devoted to weaving such fabrics as stripes, ginghams, outings, drills, tickings, and awnings on power looms. During the latter part of the year hand looms are used to demonstrate the work done in designing. This work is very valuable, impressing the student with the sequence of movement of the looms parts in weaving, and giving clear insight into the influence of counts, twists, coloring textures, and weaves upon the woven fabrics.

Lecture work begins with the Junior year, the first term being devoted to an exhaustive study of the construction, operation and fixing of plain looms. The student makes drawings of the principal motions, illustrates their use and prepares notes on the causes and remedies for fabrics of faulty construction. Instruction is given in cam design, harness rollers and straps, timing of parts, etc. A considerable portion of the second term is devoted to similar work on automatic looms in illustrating such special features as the high roll take up, magazines, warp and filling stop motions, thin place preventers, feeler motions, shuttle changing mechanisms, etc. The recitation work includes all of the latest methods of yarn, fabric and loom calculations. The practical work of the Junior year is confined largely to dobby weaving and the preparation of warps for fancy work.

More advanced work is done in the Senior year, such as the study and comparison of single and double pick box motions, plate and chain repeaters, single and double index dobbies, special shedding motions, Jacquards, etc. These and similar details are drawn and written up in note form. Loom fixing is taught by means of lectures, demonstrations

and practice. As each loom motion is studied, troubles which might occur are discussed and methods pointed out for fixing. Looms are being constantly taken apart, erected and the parts re-set by students, in addition to the routine work in fixing required by the many looms in almost continual operation. The practical work of the Senior year is confined principally to Jacquard weaving, laying out work for the dobby looms, fancy warp preparation, cloth finishing, and loom fixing. The splendid equipment in the weaving department is not approached by that of any similar institution, and is receiving such additions as are required from time to time.

BLEACHING AND DYEING. The laboratory and dye houses are well equipped with all necessary apparatus, chemicals, dye stuffs, fixing agents, etc. for proper instruction. The school owns a valuable collection of dye specimens, yarns, chemicals, dye woods, and coloring matter. The Senior class works in the laboratory and dye house four hours per week through the year. The student bleaches cotton cloth and yarn, and dyes several kinds of textile materials on a small scale, being furnished with cotton, wool and silk for this purpose; and the class also dyes larger quantities of cloth and yarn for use in our weaving department.

MECHANICS. Besides understanding the different processes of cotton manufacture, a mill superintendent is expected to manage the motive-power, operation and general economy of an entire plant. To this end a special course has been provided in the department of Mechanical Engineering. In the first term of the Senior year the student takes up Strength of Materials. The second term is devoted principally to the steam engine, power transmission, and machine design. In the second term of the Senior year a thorough course is given in Mill Construction, Mill Ventilation, Mill Sanitation, and Fire Protection. Humidifiers, sprinkler systems, and heating systems are studied in detail. The student in this course also has the advantage of attending a course of lectures in the management and operation of manufacturing plants.

Clemson Textile School.

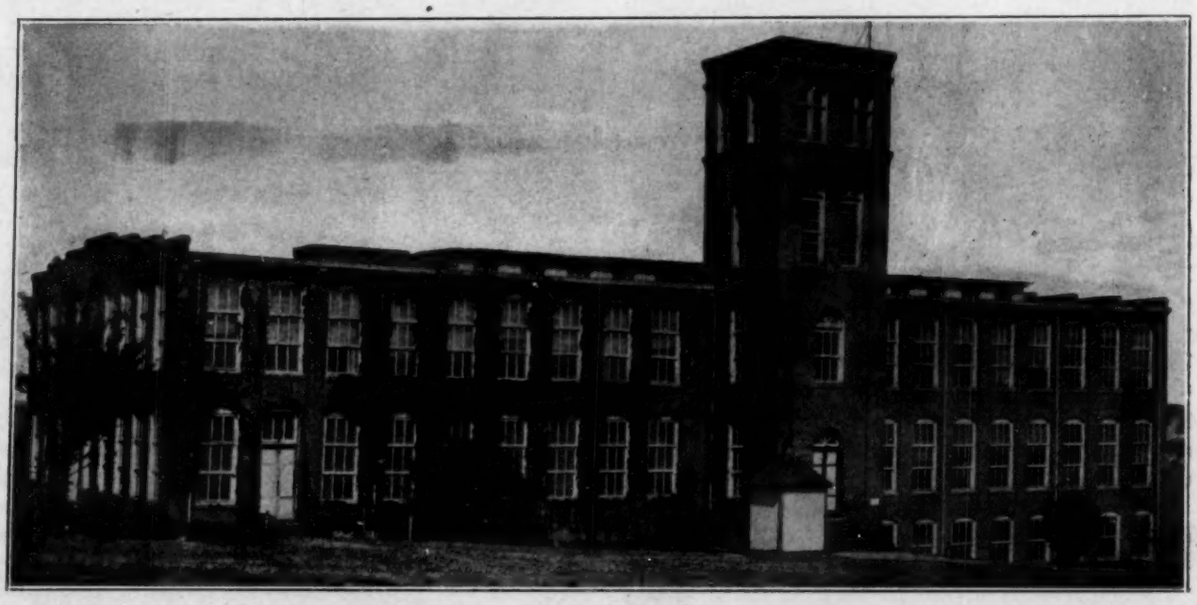
CHAS. S. DOGGETT, DIRECTOR.

This department of the Clemson Agricultural College of South Carolina was opened in 1898 with J. H. M. Beaty, now general manager of the Olympia Cotton Mills, Columbia, S. C., as director. The building was erected by the college; the equipment is very largely due to the generosity of the manufacturers of cotton mill machinery. The school is thoroughly equipped for making cotton yarn and cloth from the raw cotton; no goods are made for sale. The installation embraces various types of machines that the students may become familiar with them all. The only duplications are the seventeen hand looms, and three Jacquard machines, these however, being attached to different makes of looms. A chemical laboratory with accommodations for 64 students and the dye-house complete the plant. The building contains several class rooms and a textile museum. The machinery is driven by electricity from the college power station.

The courses, in the order of their establishment, are as follows:

A four-year course in textile engineering, upon completion of which the student receives a degree of bachelor of science. A two-year course, designed for young men from the mills, for admission to which only a knowledge of arithmetic and the elements of English are required, aside from a minimum age limit of eighteen years together with some experience in a mill. A six-weeks course in cotton grading, beginning with the opening of the second term at the first of January: A post graduate course.

Until quite recently, the cotton grading course was unique among the courses of textile schools. The work is



TEXTILE BUILDING—CLEMSON TEXTILE SCHOOL.

TEXTILE STUDENTS AT CLEMSON TEXTILE SCHOOL.

confined to constant practice in grading sample bales, a study of the fiber as such, and a study of the value of the different grades to the manufacturer. The post graduate course is, in general, a continuation of the regular four-year course, with the addition of such subjects as will lead to a proper understanding of industrial affairs. The student is given opportunity to devote the greater part of his time to a single subject, such as designing, Jacquard weaving, dyeing, and so on. Frequent discussion of the topics is taken up, and wide reading on assigned subjects, and sociology, in so far as it touches upon mill life labor problems and welfare work, is a special feature of the course.

As this is a land grant college all regular students take military drill, and also a short course in agriculture. About eighty per cent. of the graduates have found employment within the bounds of the State.

The accompanying diagram shows graphically the salaries received by graduates of the textile school illustrating the advances made from year to year after graduation. The average of a graduate's salary at the start is $270, the average length of time before receiving an increase being two months. In December, 1909, the lowest salary of any graduate was $600, while the average was $1,911.

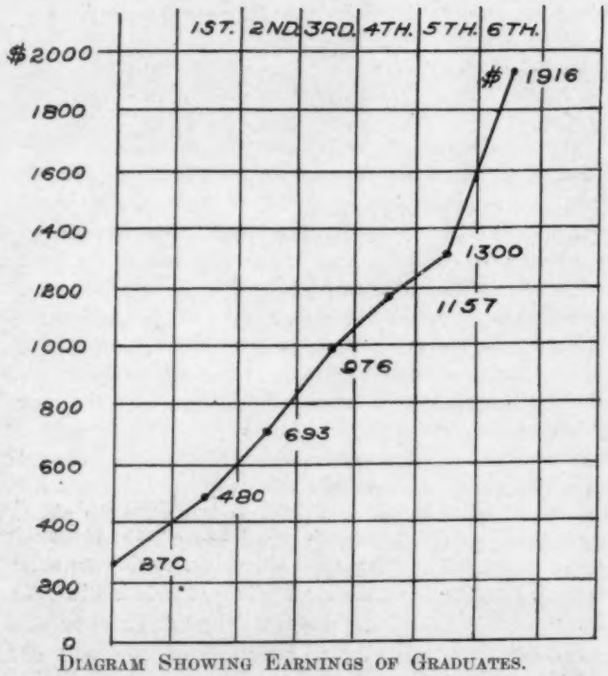


DIAGRAM SHOWING EARNINGS OF GRADUATES.

Textile Department, North Carolina A. & M. College.

THOMAS NELSON, DIRECTOR.

The Textile department of this college has a full equipment of machinery for instruction in carding, spinning, weaving, designing, knitting and dyeing. The school started in 1901 with eight day students, and now the enrollment is over fifty.

The equipment of the carding and spinning departments consists of a saw gin, pickers, cards, railway heads, drawing frames, sliver and ribbon lap machines and comers for fine yarns, slubber, intermediate, roving and fine frames, warp and filling spinning frames, spoolers, twisters, reels, Universal winder, and the necessary balances and other apparatus for determining the sizes of roving and strength of yarn.

The equipment of the weaving department consists of 20 power looms, which include plain, twill, sateen, gingham, pick and pick, dobby and Jacquard looms. Practically every kind of fabric is made in the weave room, from standard prints and sheetings to fancy dobby cloths, Jacquard shirtwaistings, table covers and crochet bed spreads. Students in designing are given instruction in the production of all kinds of fancy fabrics and also in originating new styles and patterns. The method of developing styles and patterns is carried on in a practical manner; each student is required to make a number of original patterns and weave these designs on the power looms in the weave room.

The dye house is equipped with the necessary ma-

chinery for bleaching and dyeing yarns and fabrics. The equipment consists of dye vats, bleaching vats, high pressure kier, warp sizing and drying machines, warp and cloth printing machines, hydro-extractor, steam ager, copper jacketed pan, etc. In the dyeing laboratory the necessary appliances are supplied to make tests on small quantities of yarn and cloth. A considerable number of samples of dyestuffs are contributed every year by the different dyestuff manufacturers.

The object of the dyeing course is to give students a sound practical knowledge of the fundamental principles which underlie the arts of bleaching, dyeing, or mercerizing of cotton yarn or fabrics, also scouring, bleaching, and dyeing woolen yarns and fabrics. The operation of the various machines used in bleaching and dyeing is carefully taught, and the practical application of the dyestuffs themselves is treated in the most thorough and detailed manner. Practice in color matching is given, and in this way each student acquires a collection of several hundred dyed samples representative of the various classes of direct, developed, after-treated, basic, sulphur, indanthrene, etc., dyestuffs. The course is supplemented by lectures, which include the consideration of many difficult problems that arise in the dye house, with especial reference to the dyeing, mercerizing, and finishing of cotton yarns and fabrics.

During the past year several knitting machines have been added to the equipment of the school, and instruction in this work will be given as part of the regular textile course. The machines donated include a George D. Mayo knitting machine; "Banner" knitting machine by Hemphill Mfg. Co.; Scott & Williams ribber; Wildman Mfg. Co. ribber; Beattie looper; Grosser record looper; and a combination ribber and footer made by Scott & Williams, Philadelphia. This last machine is the latest production in knitting machinery and knits the rib top and the foot on the same machine.

FOUR YEAR COURSE OF INSTRUCTION.—This covers the regular four year college course, and students are graduated with the degree of B. E. The students are given a good general education together with a complete textile course. In addition to the textile work given, instruction in the following subjects is also given: Mathematics, chemistry, English, foundry, machine shop, wood work, forge shop, engines and boilers.

TWO YEAR COURSE.—This course is intended for young men who desire to devote practically all of their time to textile work. The instruction covers, in addition to the regular textile work, mathematics, English, foundry, forge, and machine shop. This course is especially designed for young men who have had some mill experience, and is being taken advantage of by such.

AWARDS. At the Jamestown Exposition a certificate and gold medal were given the school for an exhibition of fancy fabrics and a large collection of dyed yarns. For the past two years the National Association of Cotton Manufacturers, which is composed of the leading mill men in America, awarded the students' medal to the scholar having the best average in the textile department. This school was the only school in the South to receive the medal.

TEXTILE BUILDING—NORTH CAROLINA A. & M. COLLEGE.

Many of the graduates of the four-year and the two-year courses are holding responsible positions, among them being mill superintendents, secretaries, overseers, second hands, section hands, machinery salesman, etc. An ever-increasing number of young men, equipped with up-to-date knowledge of the textile industry, both in theory and practice, can not fail to have a lasting beneficial effect in the South.

Texas Textile School.

J. B. BAGLEY, DIRECTOR.

The establishment of the department of Textile Engineering at the Agricultural and Mechanical College of Texas in 1904 was a result of the growth of the cotton manufacturing industry in the State a few years prior to that time. The development of any industry can be best fostered by having scientific knowledge of the business to aid in the practical operation of the plant.

The fact that Texas has so many natural advantages for the expansion of the textile industry, that will serve to aid her in becoming one of the greatest cotton manufacturing States in the Union, as she is already greatest in some other respects, has made it a safe and businesslike movement to establish a school of textile training to prepare her sons to carry on the work.

An industry attains its greatest measure of development by increasing the efficiency of those engaged in that industry. This principle was prominent in the minds of the original organizers of the school. People, as a rule, are rather loath to invest their earnings in industries that they know little of, so it was assumed and rightly so, that the presence of a textile school would serve to give an impetus to the growth of the business by training the sons of men who were seeking to employ their funds to advantage in the State. These leaders in the movement also recognized the fact that if the industry was properly developed, it would stand second in importance to the cotton growing industry of Texas.

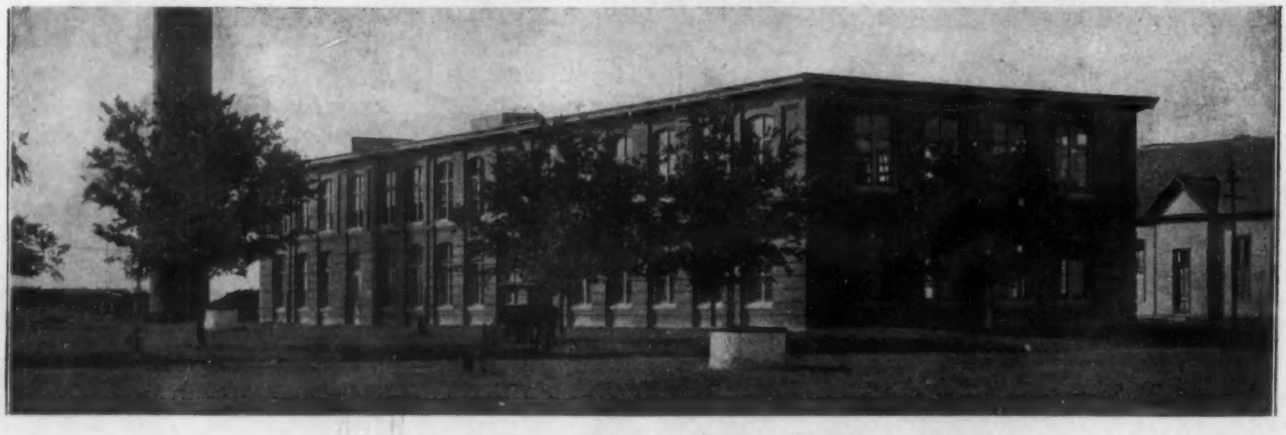
The purpose of a textile school is to teach the theory of cotton manufacturing and to give practice in applying the methods and principles employed in these arts—in short, to tell the individual what to do, show him how to do it, and then let him exercise his brain and fingers in carrying out his instructions. Just as the business of cotton manufacturing is more than simply making yarns and cloth, so it is that a textile school has a broader course of instruction and also serves to cover a wider field of instruction. The textile business can not be learned entirely from lectures and books; one must acquire his knowledge of how to operate and fix a machine by actual experience, and consequently facilities must be furnished so that the student may demonstrate for himself the value of statements made in lectures and books.

The opportunities that are offered by the Texas Textile School are very similar to those found in the other textile schools of the South. The mill equipment consists of picking machinery, cards, sliver lap machine, comber, drawing frames, slubber, fly-frames including a jack frame, spinning frames, spoolers, twister, winder, reel, warper, slasher, short chain beamer, hand looms, power looms with dobbies and Jacquards, cloth inspecting machines, railway sewing and rolling machines, brushing and calendering machine, and cloth folder. This machinery represents as great a variety of types as possible, in order to show the student the representative patterns and makes of cotton machinery.

The course in dyeing provides for one year in inorganic chemistry, two terms in organic chemistry and two terms in textile chemistry. The equipment of this department does not include practical dyeing machinery, but a thorough study is made in connection with the chemical course of the college, of the principles involved in dyeing and of the machinery used. Special instruction in the methods of handling dye plants is also given.

A cotton classing department has just been established in the school, and the course is being offered to the Agricultural as well as to the Textile students. At present there are 60 men taking this course, who belong to the Two-Year Agricultural division. There is also a short cotton classing course offered at the beginning of the winter term, which is intended particularly for cotton buyers and farmers. There have been many letters of inquiry relative to the course, thus showing the growing tendency to take advantage of such golden opportunities, and the prospect of a good attendance is very bright.

The curriculum of the textile course is being raised for the coming year; hereafter the sophomores are to take up the special work more thoroughly at the beginning of the year and carry this on through his whole course. The entrance requirements to the college have been raised generally, with a view to giving more of the student's time to the subject in which he wishes to specialize. In connection with the four-year course, there is offered a two-year textile course which takes the work a little further than the junior class of the four-year course.



TEXTILE BUILDING—TEXAS TEXTILE SCHOOL.

The Relation of the Press to Industrial Progress.

(Contributed exclusively to COTTON.)

BY F. L. SEELY, PUBLISHER ATLANTA GEORGIAN.

A subject that could be awfully dry but one that is full of energy if we are in the spirit of it.

The South produced agriculturally last year nearly one hundred millions of dollars more of products than the United States did 19 years ago—a great help and encouragement is that fact when we get it. How little we would know of such wonderful strides if the press did not give its thought to spreading such good news—such encouragement.

While the South was increasing in population—seventy per cent.—she increased her outlay for common schools 349 per cent., and what pride and confidence this fact gives us—but we would be largely ignorant of it but for the help of the press.

Capital invested in manufacturing in the South went from 250 millions of dollars in 1880 to 2,110 millions in 1909—448 per cent. increase. It is not too much to say that these wonderful strides would have been impossible without the courage, the stimulation, and the strength the press has given by the dissemination of the knowledge of our progress to our own people and our customers.

The Government makes a business of securing statistics and facts regarding our growth and conditions—but how many read or understand the census—how many get it? The publications of to-day should, and the lives ones do, hold as one of their highest privileges the boosting of industry and the encouragement of industrial capital. The paper of which I have the honor to be the publisher has for years carried on its editorial page a feature that we call "Growth and Progress of the New South," and under that head we give a report of new mills being built, new schools, new buildings, new factories, and in fact every mark of industrial progress which we can glean and report in the South.

F. L. SEELY.

One of the greatest publication successes in the world, financially and every other way is a paper in Los Angeles, Cal., and it has the reputation of being the greatest booster of industry and development of any paper in the world.

A newspaper receives from fifty to sixty per cent. of its income from advertising; if its advertising did not bring results its clients would cease to give it support. If a newspaper can boost a department store by its advertising columns, it certainly should be able to boost the industries that give that department store life by keeping an eye keen to the interests of its city's and its state's industries.

Publications prosper as our industries prosper. A paper helps itself when it helps industry, when it attracts capital and when it is a builder in itself.

A paper stagnates industry—stands in the way, blocks the game when it saps from a community or from a section an existence, and gives nothing back, because it is ridden with interests that muzzle in and stifle its utterances if they conflict with those who desire monopoly, who oppose competition, or if it is the tool—the organ of a political ambition.

A publication can be the livest help industry can have if it has life and a broad viewpoint, and a spirit to pull for better things—but it can be the deadest—most impotent hindrance if it fails to see that publicity is the greatest aid to progress.

The Progress of the World.*

A recommendation that shows lack of full study advises the increase of postal rates on newspapers, magazines, and periodicals. For a long time second-class matter has been carried at one cent a pound. If this is less than it costs the government to transport and distribute newspapers and periodicals, it does not necessarily follow that the rate ought to be raised. Within the memory of middle-aged persons postage on newspapers and periodicals was paid by the subscribers at their local post-offices. The change of law requiring advance payment at pound rates by the publishers shifted the burden from the subscribers and was a convenient reform. It is true that printed matter constitutes the large part of the mail carried by the government. But the periodicals do more to nationalize literature and public opinion than any other one thing. Furthermore, very much of the profitable business of the postoffice department grows directly out of the publicity created by newspapers and magazines. Even the direct transactions with the post-office of a publisher are profitable to the government, inasmuch as the purchases of postage stamps for the carrying on of correspondence with subscribers, and the other postal business of such an establishment, give the government far more profit than its handling of the magazines at the rate of one cent a pound can cause it loss.

Mr. Taft is of the opinion that the magazines carry

*Editorial from the "Review of Reviews," January, 1910.

more advertising in proportion to reading matter than the newspapers. This, as it happens, is an entire mistake. But the suggestion gives opportunity to explain that of all the business done by the post-office department the most profitable is the carrying of advertising. Rather than force magazine advertising out of the mails, the government could better afford to carry it for nothing. The chief object of the reputable business people who patronize the advertising pages of the periodicals is to provoke correspondence. A single advertisement on one page of a periodical has brought to the advertiser seventeen thousand letters. Each one of these letters starts a return patronage of the mails. The actual carrying of that advertisement has cost the government an infinitesimal sum. The return received by the government has been the large profit upon the sale of many thousands of two-cent stamps. It is impossible properly to consider the rate of postage to be charged by the government on one class of matter without studying the relation of the rates on different classes to one another. Mr. Taft is actuated by a commendable desire to lighten the burdens of the government and to introduce economies. But as a matter of fact the carrying of newspapers and periodicals is not a burden to the postoffice department, and it is a great boon to the intelligent public of America.

It should be borne in mind that what he calls the deficit in the post-office department is not real. The post-office department is earning a large surplus profit on the business it carries on for its patrons. Even if all publishers and private individuals and firms withdrew their business from the postoffice department, the government would still have its large distribution of letters and printed material to make for congress, for the departments at Washington, and for the official business of several hundred thousand people constituting the civil and military services of the United States. It would probably have to pay from seventy-five to a hundred million dollars a year to carry on its own postal business. Yet the books of the post-office department do not make any account whatsoever of this vast item. It is safe to say that there is no other government in the world whose postal department is not credited with the expense it incurs for handling the business of the other departments. It is a scandal and a public disgrace that business should be done so loosely at Washington that no postoffice records are allowed to show what it actually costs to distribute the speeches of congressmen, the documents sent out from the Agricultural and other departments, and the millions of letters relating to government business. It is just as much a matter of government expense to transport official documents as to transport troops. The war department makes record of the cost of transporting troops, but no reports of the postoffice department indicate the cost of carrying the government's own materials.

Furthermore, the enormous extension of free rural delivery has added a burden of many millions of dollars to the postoffice department without bringing immediate financial returns. Congress ought to have made some direct appropriation for this service. Even if the free rural carriers could be permitted to deliver small parcels for the benefit of the people on their routes, this valuable extension of the service could soon be made almost self-supporting. It is not uninteresting to note the fact that certain express companies and other private interests are always lobbying at Washington to prevent the passage of such measures as a parcel post for the convenience of the people. And the public may just as well be informed of the fact that these same interests have been busily at work for some years trying to secure an advance in the postal rates on periodicals and newspapers. It only needs statement to make it clear that if magazines and newspapers were thrown out of the mails by prohibitive postal rates, certain news companies might hope to play a larger part in the distribution of such periodicals. The subject is one that Mr. Taft has not taken up as yet at first hand, and in the multiplicity of great topics that have been crowding upon his attention in the opening weeks of his term, it is, perhaps, not strange that he should have been misled in a few matters.

There is more need in the postoffice department of a careful reorganization than in any other branch of the government. Mr. Taft's idea of driving a wedge between the newspaper and the periodicals of more general circulation seems wrong in principle and is based upon a misunderstanding of the facts. Free delivery within the country is already a great discrimination in favor of newspapers. Furthermore, the cost of handling each individual piece is a more important item than the cost of transportation by the pound. Thus it costs the government a great deal more to handle a pound of newspapers, consisting of a number of separate papers to be distributed to different people, than to carry a single magazine weighing a pound to one subscriber. Yet Mr. Taft, through misapprehension, states the matter in exactly the opposite way. The magazines are chief producers of the lucrative business of the postoffice. Even without revision of the very favorable contracts with the railroads for carrying the mail, and without the other economies that could be brought about by a better business organization of the postal service, there is so large a profit collected by the government upon all the business that the postoffice does for private patrons, including the newspapers and periodicals, that this surplus practically pays the government's own great bill for carrying and distributing its own mail matter. The magazines and periodicals of this country confessedly surpass in merit those of any other part of the world. Their merit is due to their patronage by a great and intelligent nation spread from the Atlantic to the Pacific. A hostile postal policy such as Mr. Taft proposes would have made impossible the development of such valuable and beautiful expressions of our life as are typified, for example, by the Century Magazine. Let the postoffice department set its own house in order, give us a balance-sheet of its real transactions as the other departments of the government do, rid itself of its harmful and extravagant relations to politics and party spoils, and bring a permanent business head to the conduct of its large affairs. Then, if necessary to deal with such delicate questions as radical changes in rates, there will be time enough to discuss them on their merit.

This year's crop, including its by-products, will represent a valuation of $1,000,000,000 and when spun into cloth $2,000,000,000 additional. This is an asset that any country would be proud to possess. It is estimated that there are more than 1,500,000,000 people in the world, and when it is said that only about 500,000,000 regularly wear clothes, that only about 750,000,000 are partially clothed, and that about 250,000,000 habitually go almost naked, the future holds out every promise of prosperity for the Southern States.

COTTON MANUFACTURING

AN IMPROVED YARN SINGEING MACHINE.

(*Contributed exclusively to* COTTON.)

BY THEODORE F. HUSSA.

Singeing by gas was employed for the first time in 1847. Since that time many different machines have been invented for the purpose, each aiming in its own way to secure increased rapidity of working with a corresponding reduction of gas and labor.

In view of the fact that electricity is the most easily handled and adaptable of all agents for the transformation of energy, it might have easily been anticipated that it would find application to an industry of such a delicate character as singeing. Nevertheless, despite the apparent simplicity of the problem, a period of more than thirty years has been required to attain a satisfactory and really practical result.

The object of electrical singeing is to utilize the heat radiated by an incandescent conductor of electricity for burning off the projecting fibers on the yarn. The employment of industrial currents has been rendered possible by an inventor named Gin who used as the incandescent body a long metal tube of a circular and flattened section which opens along a generating line to permit of the insertion and suspension of the yarn to be singed. Gin adopted the plan of leaving one end of the tube movable, and subjecting it to a sufficient longitudinal tension to keep it perfectly straight without reaching the limit of elasticity of the metal.

The following particulars and illustrations relating to the system invented by Gin have been supplied by the Societe Anonyme Electro-Textile, of Paris, makers of the improved electrical singeing machine. Fig. 1 is a perspective view of a singeing tube the body "a" of which is in the shape of a hollow square tube. The electrical connection is effected by means of the lugs "b" and the tube is consequently heated. The yarn may be passed further through several consecutive tubes arranged in series as shown in Fig. 3; or again, through a number of passages made by bending a single piece into proper shape as shown in Fig. 4.

In order to afford a clear idea of the application of the means adopted to counteract the expansion of the tubes, a unit of the gassing apparatus is illustrated in Figs. 5, 6, and 7, of which Fig. 5 is a front view of the unit; Fig. 6 is a cross sectional view, looking at the unit from the end of the machine; and Fig. 7 is a perspective view of the unit, showing the position that a thread occupies when the machine is in operation. The platinum tube "a" which is encased in a porcelain tube "k," is connected by means of its terminal lugs with two metal clamps, one of which "b" is fixed, while the other "c" in Fig. 6 is free. The clamp "c" carries rods "d" capable of sliding in the guide apertures of the U-shaped piece. The lugs of the burner are fastened to the clamps by means of thumb screws shown at the top and bottom respectively of the illustrations. The connecting clamps are connected with the current leads by spring clips as shown at the bottom of the illustrations, and the junction between the movable clamp and the corresponding clip is effected by flexible cables. The two clips and the fixed clamp are mounted on a base plate of slate or ebonite "i" to which is also attached the porcelain casing "k" which is used to lessen the loss of heat by radiation from the platinum tube.

A great improvement has been effected in these electric singers by modifying the shape of the platinum tubes. It has been mentioned that in order to permit of the passage of the yarn, the tube is opened all the way along a generating line. If now two symmetrical strips are formed at one end, along the diametrically opposite generating line, said strips may be bent round spirally, thus furnishing a flexible connection which responds to all of the movements of expansion made by the tube, and prevents any deformation of the latter.

Any number of these tubes may be mounted on bars carrying the current, and in this way a machine may be equipped with any desired number of drums. The current is supplied to the outermost bars by a special transformer which receives the primary current at the tension of the main, and supplies the secondary element with current at a tension and density corresponding to the number and di-

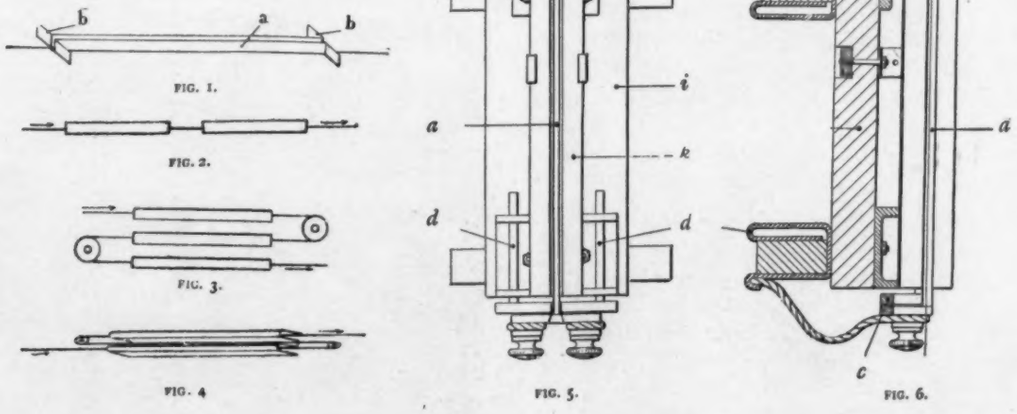


FIG. 1. FIG. 2. FIG. 3. FIG. 4 FIG. 5. FIG. 6.

DETAILS OF ELECTRIC SINGEING TUBE.

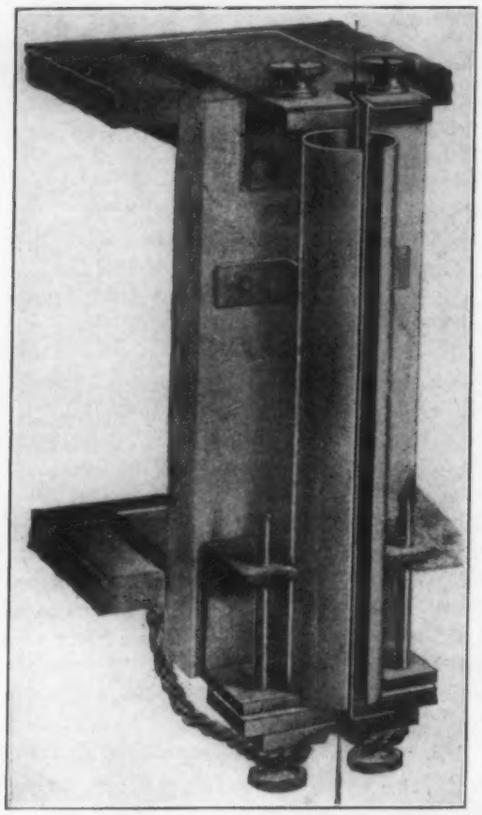


FIG. 7. PERSPECTIVE VIEW OF A SINGEING UNIT.

mensions of the units, and in accordance with the desired temperature. This temperature depends on the number of the yarn, and on the speed at which it is put through the machine, and may be regulated by varying the number of turns of either the primary or secondary windings by means of a step commutator. With a sufficient number of steps, it is possible to obtain any temperature between dull red heat and dazzling red heat and dazzling white heat.

The burners are mounted on a creel as shown in Fig. 8, similar to those employed in ordinary gassing machines, in which the operations of unwinding, gassing, and rewinding the yarn proceed continuously. After having traversed its respective burner, each yarn is guided in a suitable manner and enters a helical groove provided in a revolving drum. In traversing this drum the yarn receives a lateral movement back and forth, which enables it to be wound on a bobbin as shown. This bobbin is held in contact with its cam cylinder which causes it to revolve in such a way that the winding is effected at a constant peripheral velocity. The cam cylinders of the machine are mounted on a common shaft, which may be operated direct by an electric motor, or driven by pulleys through a second motion. In the latter case a series of change gears enables different winding speeds to be obtained.

The commutators of the starting and excitation resistances are mounted on the same board as the commutator of the transformer supplying the current to the burners, so that the attendant has convenient access to all of the means of controlling the machine. The steps of these commutators and also those of the transformer, may be marked to indicate the most suitable to use for different yarn numbers. The machine is completed by the provision of a yarn catcher, to facilitate the piecing of broken yarn and restarting the machine after stoppages. The complete elimination of the dust and products of combustion is effected by suction tubes arranged under each burner and connected with a main trunk communicating with a fan. By this means the ventilation of the gassing room is greatly improved when electric singers are used. Each machine can be easily managed by a single attendant.

The comparison of gas singeing with electric singeing is set forth as follows: The gassing of yarns by means of burning coal gas presents a number of points for consideration. The consumption of gas is great, and the utilization of the heat is so imperfect that it is estimated that more than 96 per cent. of this heat is completely lost by dissipation in the air of the gassing rooms. Furthermore, the fluctuation in the pressure of the gas from the mains at different hours in the day results in a corresponding irregularity in the gassing process, and this unevenness is accentuated by the flickering of the gas flames in the slightest draught. Owing to the impurities and tarry matters contained in the gas, the color of the yarns is sometimes spoiled, and they also acquire a disagreeable smell. Considerable risk of fire and explosion is also caused by the arrangement of the gassing rooms, thus entailing incessant supervision. The combustion of such large volumes of gas makes the rooms hot, and is attended with the liberation of injurious quantities of carbon monoxide and carbon dioxide, which can only be remedied by a complicated system of ventilation, with an extensive series of pipes and considerable outlay on motive power for the fans, etc. It is well known that operatives in gassing rooms are liable to gradual poisoning by carbon monoxide, the malady being manifested by frequent headaches and progressive anaemia.

With electric singeing, not only is a more complete util-

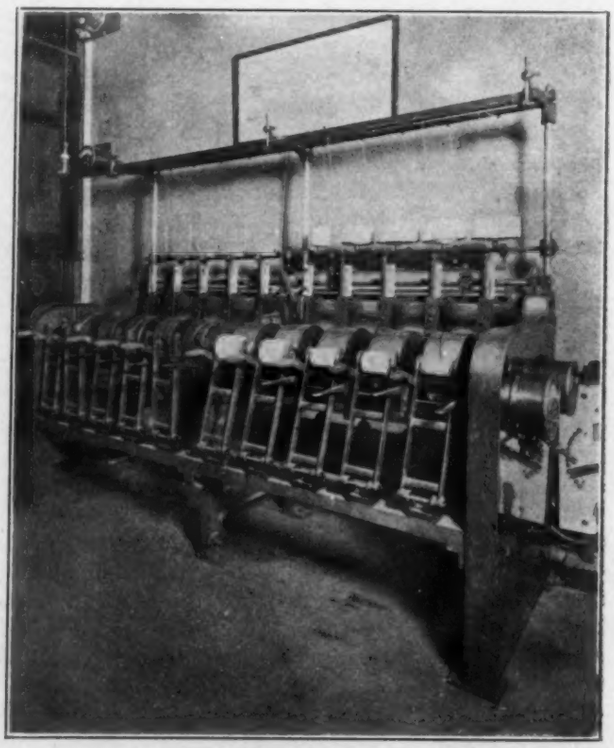


FIG. 8. VIEW OF THE ELECTRIC SINGEING MACHINE. THEODORE F. HUSSA, NEW YORK CITY, SOLE AGENT.

ization of heat effected, but at the same time only a small quantity of heat escapes into the room, and there is no injurious gas produced apart from the carbon dioxide resulting from the combustion of the projecting fibers. Yarns singed by electricity are only slightly discolored, the smell is less decided, and the shade is uniform. Finally, the small fibers and down are cleanly and completely eliminated. Dyed yarns can be singed without affecting their color, most satisfactory results being obtained.

It is interesting to note that the temperature of the singeing tubes in electric singeing machines can be varied by almost imperceptible degrees, and adapted with great accuracy to the number of the yarn under treatment and the rate of unwinding. It is evident that this degree of control is impossible when gas is used. Careful tests have been performed, extending for more than six months, in order to obtain a full acquaintance with the working of the electric burners. These tests were carried out at the Hellemmes doubling works with a very large series of yarns of different numbers, twist, and origin. The results show that the process is more economical in proportion as the speed of winding is increased. A speed of 440 yards per minute is generally employed, as often as the tension of the yarn permits.

To recapitulate: The use of electricity is one of the most economical methods of singeing. To make this result complete it is desirable to obtain comparative figures giving the annual expense in two singeing works employing gas and electricity respectively. It was shown in the same test that the high speed was practicable with safety in the case of electric machines. It may be added that the process is equally applicable to the singeing of other textile fibers, and more particularly to schappe silk.

AN AUTOMATIC TENSION REGULATING THREAD GUIDE FOR WINDERS.

Invented by Clifton Corley, Supt. Tennille Yarn Mills, Tennille, Ga.

With the ordinary thread guide in general use on several types of winders, it is practically impossible to get an equal tension on the yarn throughout the process of winding said yarn from a cop located near the bottom part of the machine, to the tube or cone.

In other words the tension on the yarn will be much greater when the cop is nearly empty than when it is full and extends to the top of the spindle that holds it. With soft hosiery or underwear yarn, which a winder has often

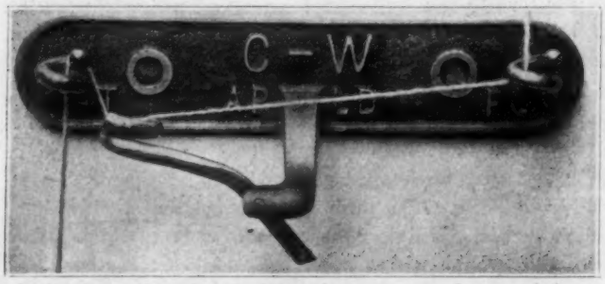


FIG. 1. THE CENTRAL EXERTING TENSION ON YARN.

to deal with, this condition necessarily makes a great deal of waste, because the yarn frequently can not stand the strain put upon it when the cop is nearly empty. If we begin to wind from a full cop, with the maximum tension on the yarn that it can safely bear, which tension is necessary to produce a firm cone, then when the yarn gets low on the spindle or "bottoms" as it is generally called, a large number of yarn breakages will invariably occur, due to the increased tension on the yarn caused by the whipping of the yarn about the spindle. The result is that the end will not stay up, and a small bunch of yarn will in each case be left on the tube and become waste material. This waste is generally pulled off of the spindle by the winder hand and stuffed into a pocket. The amount of waste thus made varies with the weather, quality of the yarn, etc., and may amount to from one half pound to three or four pounds per 100 spindles in a day. Even when the greatest care is taken to obviate this difficulty, more or less waste from this cause is always in evidence, and at the same time the yarn on the lower part of the cop is always subjected to undue strain.

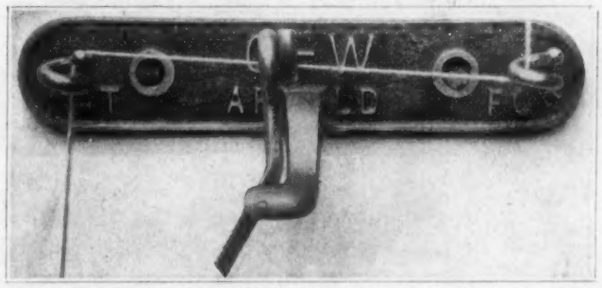


FIG. 2. THE CENTRAL GUIDE EXERTING NO TENSION.

The automatic tension regulating thread guide shown in the accompanying illustrations is a simple and effective means of preventing this undue strain and breakage of the yarn. It will be seen from the illustrations that the device consists of a solid casting which has to be screwed to the winder rail, and on this casting are three thread guides, two of which are fixed—one at each end—and the third guide is pivioted on an arm extending slightly down from the center of the casting. This thread guide is pivoted so that it is movable from a horizontal position to an almost vertical position.

The illustration (Fig. 1) shows the central thread guide in the position that it occupies when a full cop is just beginning to be unwound. The guide is threaded by giving the yarn three rotations in the same direction—one for each thread guide. The center thread guide controls the amount of tension on the yarn; when in a horizontal position it applies the greatest tension, and when in a vertical position, which is shown clearly in the illustration (Fig. 2), it exerts no influence whatever upon the yarn. Thus when a full bobbin starts to be unwound and the tension is always least on the regular winder, the central thread guide exerts its greatest effect and is in a nearly horizontal position. As the cop gets smaller and the whipping action produces added tension, the central guide automatically adjusts its position, so that the tension remains the same. Finally the tension due to the whipping gets sufficient to lift the guide into a position just beyond the vertical and it remains there, thus exerting no influence on the yarn. This action relieves a certain amount of tension and allows the yarn to be unwound entirely from the cop without breaking.

KNITTING

TYPES OF FEEDS ON LOOP WHEEL KNITTING MACHINES.

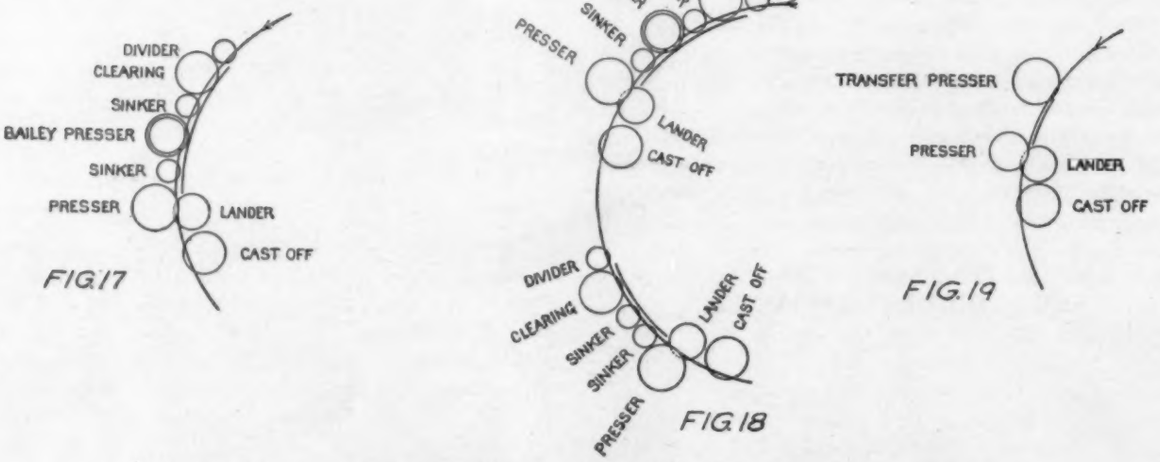
FEEDS FOR PRODUCING FUR-CLOTH AND ASTRACHAN.

(Contributed exclusively to COTTON.)

BY ERNEST TOMPKINS.

PART III.

Fur-cloth and astrachan come under the head of plush, but the feeds are generally more extended than the familiar feed used for making fleeced underwear. There are two reasons for this exception; one is that the gauge is generally coarser than that used for underwear; the other is that more burs are generally used in a feed. The ordinary arrangement for fur-cloth is similar to diagram Fig. 15 with the addition of a divider placed ahead of the push-down. The principal use of this divider is to turn the cloth inward ahead of the push-down in order to keep the wool thread from coming down on the outside of the needles. It also helps to divide the stitch although it can not do much in this regard, because the stitch is already tied.



DIAGRAMS OF DIFFERENT TYPES OF FEEDS FOR LOOP WHEEL KNITTERS.

Diagram Fig. 17 illustrates one of these fur-cloth feeds. It is made up as follows: (1) Divider, (2) Long push-down, (3) Clearing, (4) Sinker, (5) Bailey presser, (6) Sinker, (7) Presser, (8) Lander, and (9) Castoff.

It will be noticed that the Bailey presser is used; this is a general custom for this character of work. It is about the only field in which the Bailey presser has not been superseded by the extra lander.

Astrachan is generally made with alternate plush and plain feeds. The plush feed is similar to the one described for fur-cloth. The plain feed is generally two-thread, preceded by a divider for turning the cloth onto the inside of the needles. Diagram Fig. 18 represents a complete astrachan feed. It is made up as follows:

Plush division: (1) Divider, (2) Long push-down, (3) Clearing, (4) Sinker, (5) Bailey presser, (6) Sinker, (7) Presser, (8) Lander, and (9) Castoff.

Plain division: (1) Divider, (2) Short push-down, (3) Clearing, (4) Sinker, (5) Sinker, (6) Presser, (7) Lander, and (8) Castoff.

Transferred work, mesh, or porous work, as it is differently called, is made with a transfer attachment, and not with a feed, because it has to take previously formed stitches and manipulate them so that two of the stitches are combined. The increase in this work from the time of its introduction in this country in 1901 has been phenomenal. Many improvements and modifications have been made in the attachment, and many different patterns of the fabric have been introduced. So many patents have been granted for the construction of the attachment, for designs in the fabric and for the construction of the fabric that the general public has been much mystified thereby. Indeed the mention of a porous fabric is at once suggestive of claims for infringement. It will not be out of place, therefore, to give a brief outline of the situation in this regard.

The first transfer attachments used in this country were adaptations to the American machine of a device patented by H. Wildt in Great Britain but not in this country. This adaptation of the Wildt device was also not patented, and is illustrated by diagram Fig. 19, being made up as follows: (1) Transfer presser, (2) Push-down, (3) Tuck presser, (4) Lander, and (5) Castoff.

The transfer presser held the heads of the needles together in pairs. The push-down forced the stitches down on the needles, but since some of these were held together, one stitch would go down over both needles, the other stitch remaining on its own needle. The lander then raised the stitches, and the tuck presser closed the beard of the needle of the stitch to be transferred, so that this stitch was pressed clear of it own needle. It retained on the other one of the pair which also held its original stitch, so that

two stitches were held on one needle while the adjacent one was entirely clear. The succeeding plain feeds formed stitches on this needle as well as the others, which stitches arriving in their turn at the transfer attachment were again transferred according to the pattern of the pressers. These operations are neither patented nor patentable in the United States.

However, devices designed to facilitate these operations have been patented, the objects being to decrease the breakage of the needle due to the bending of the heads of the needles together in pairs, to divide the stitches so that the stitch to be transferred will be sufficiently long to readily embrace the two needles, and to provide greater security of the transfer, etc. At least one design patent has been granted covering the location of the transferred stitch in the plain field. Patents have also been granted, covering the combination of the transferred stitch and a tuck stitch in a certain way.

DYEING, BLEACHING AND FINISHING

MERCERIZATION.

(*Contributed exclusively to* COTTON.)

BY M. H. O.

Mercerization is a combined physical and chemical process for producing a silky luster on cotton yarns and fabrics. The process consists essentially in submitting the yarn or cloth held in tension to a cold concentrated solution of caustic alkali. The process was originated by John Mercer, a calico printer in Lancashire, England, which he patented in 1850. He did not, however, apply to his discovery the tension process which is now mechanically effected and has been used only during the last ten years. Therefore, Mercer's discovery did not become a commercial success until within the last decade, but within this time cotton manufacturing has been somewhat revolutionized by the process in the turning out of a product, whereby cotton in the form of yarns or fabrics has had a novel effect upon the industry; establishing an era of the greatest importance in the production of cotton fabrics which are employed in substitution for silk.

The process of lustering cotton, as invented by Mercer was to pass the cloth through a padding machine charged with caustic soda or caustic potash of specific gravity of from 60 to 70 degrees Tw., at the common temperature, say 60 degrees Fahrenheit or under, and without drying the cloth wash it in water, then passing it through dilute sulphuric acid and washing again.

The process depends upon the fact that if a cotton fiber is steeped in a solution containing 20 per cent. or more of caustic soda (NaOH) 40 deg. Tw., its structural appearance in greatly changed from that of a flattened spiral tube with thin walls and a relatively large central cavity, to a straight and more or less cylindrical tube with thick walls and a greatly diminished central cavity. This effect is due to the formation of a chemical compound $(C_6 H_{10} O_5 + NaOH)^x$ in a state of hydration. By treatment by water the alkali is removed, and cellulose regenerated, not, however, in its original form, but as a hydrate $(C_6 H_{10} O_5 + H_2O)^x$ which permanently retains its characteristic appearance and properties.

One of the most apparent effects of the process of mercerization is the contraction that takes place in the yarn or fabric treated. The degree of contraction, however, varies with the character of the material and the intensity of the action, from 1-15 to 1-5 of the total length and breadth in the case of cloth.

The strength of the cloth or the yarn is increased by the process, to about double its original strength. The weight of the cloth is also increased, the permanent increase being between 4-10 and 5-10 per cent. Furthermore, a notable change is brought about, in that the fiber acquires a greatly increased affinity for most coloring matters, the effect being particularly well marked in the case of direct cotton colors and also with Turkey Red. When dyed in an indigo vat, mercerized cloth requires only one dip to produce as deep a shade of blue as can be obtained on ordinary cloth after five or six dips. The same effect is produced in the use of other dyes in which a fuller and richer color is obtained.

The present process of mercerizing requires a bath, consisting of a caustic soda solution usually kept at a specific gravity of between 50 and 60 degrees Tw. For the best results the temperature of the bath should be quite low or about 60 to 70 degrees Fahrenheit. Though the time for the material to remain in the bath is of little consequence after it has become thoroughly saturated, ten minutes is usually considered to be sufficient. During this period the yarn is kept under tension from the time it enters the bath, although by some methods the tension is applied to the material after it is removed from the bath, but in either case the lye should be washed from the yarn before the tension is removed. The physical side of the mercerizing process has received more attention in an effort to improve this branch of the work, than the chemical side.

One of the first applications of Mercer's process was in the manufacture of silk and of worsted crepons, which at one time were much in fashion for light dress fabrics for ladies' wear. The effect upon these materials was that the crepe or crinkly features of the goods were not lost by washing or by dyeing.

As now employed the mercerizing process is of the greatest commercial importance in the manufacture of cotton, owing to the mechanical means for preventing the contraction of the material, which normally occurs during the treatment with concentrated caustic soda or other alkali.

The mechanical method which has made mercerizing a commercial success was first brought prominently to the attention of manufacturers by the patent of Thomas and Prevost in 1896. Since then there have been many mechanical apparatus invented and patented for accomplishing this purpose, many of the more successful ones being made by concerns in this country.

The degree and character of the luster approximating that of silk is largely dependent upon the kind of cotton used, the Sea Island and Egyptian combed cottons being generally esteemed as producing the best effects. The yarn to be mercerized should be hard twisted, as the fibers in

loose twisted yarn are liable to slip during the tension, therefore a high degree of luster can only be obtained when the twist is sufficient to prevent slipping.

CHEMICALS USED IN THE TEXTILE INDUSTRY.

(*Reported exclusively for* COTTON.)

BY DR. FREDERIC DANNERTH, CONSULTING INDUSTRIAL CHEMIST.

LECTURE VI.

(*Continued from December.*)

MANUFACTURE OF HYDROCHLORIC AND NITRIC ACIDS.

Hydrochloric acid, known to the trade as muriatic acid (meaning salt acid) is a striking example of the beneficent influence exerted by municipal laws on industrial development. The process which was evolved by the French chemist Leblanc for the manufacture of carbonate of soda consisted in treating common sea salt (sodium chloride) with concentrated sulphuric acid, whereby glauber salt (sodium sulphate) and muriatic acid were formed. At the time when this process was introduced, the surrounding country was much troubled by these noxious acid fumes, and all vegetation was destroyed. After due deliberation the manufacturers agreed to render these acid fumes harmless by leading the vapors through water, but on closer investigation they found that the water so obtained possessed important properties. Among its many virtues they found that it dissolved most metals and reacted with soda ash to form sodium chloride,—the raw material which they had used for their process. The commercial acid contains about 34 per cent. actual hydrochloric acid and shows the specific gravity 1.18.

Nitric acid, sometimes termed "aqua fortis" (meaning strong water), is prepared commercially by treating sodium nitrate with concentrated sulphuric acid in large iron cylinders from which it is distilled, the fumes being led through suitable condensers into stoneware receivers. The residue which remains in the retorts is a mixture of sodium sulphate and sodium acid sulphate, which is known in commerce as "niter cake." Sodium nitrate is obtained from Chile in South America, while potassium nitrate occurs in large quantities in British India—they are both known to the trade as "niter" or "saltpetre." Although now found only in the laboratories of textile mills, nitric acid was originally used as an oxidizing agent in the preparation of "nitrate of iron," a term which is misleading as the product is really a basic ferric sulphate containing no nitric acid whatever.

Aqua fortis was formerly used for testing "blue" on wool, as the presence of the valuable Indigo dyestuff was indicated by the appearance of a yellow spot. This test is now of no value as many other aniline dyes show the same reaction.

Commercial nitric acid contains about 60 per cent. of achial acid, the remainder being water. The specific gravity of this acid is 1.35.

OTHER INORGANIC ACIDS.

A large number of the inorganic acids are of no value to the colorist and bleacher when in the "free state," while the compounds derived from them (the salts) are in some cases of very great importance. By far the greater number of the salts which find application are sodium or potassium compounds, a fact which is due to the ready solubility of the sodium and potassium salts in water, to the lower price of these salts, and to the comparative ease with which they may be prepared on a large scale.

CARBONIC ACID is used in the form of those important compounds known as pearl ash and soda ash, concerning which we will have more to say in Lecture VIII. under "Alkalies."

BIBORIC ACID in the form of sodium biborate (borax) is used in the dyeing of "alkali blue" on wool. It is a mild alkali, and may therefore be used for neutralizing acids.

BICHROMIC ACID is used in the form of its potassium salt, bichromate of potash, or "chrome" as it is sometimes termed by the dyer. It finds extensive application for mordanting wool before dyeing with the alizarine colors, as well as for stripping colors from shoddy stock.

CHLORIC ACID in the form of potassium chlorate has long been used as an oxidizing agent in the production of aniline black on cotton hosiery.

FERROCYANIC ACID is known to the dyer in the form of its potassium salt, yellow prussiate of potash. It is used for the production of Prussian blue on cotton yarn or on silk as a ground for heavy blacks. It is also used in the production of aniline black according to Prudhomme's method, in which case it plays the part of an oxidizing agent.

FERRICYANIC ACID is used in the form of potassium ferricyanide (red prussiate of potash) as an oxidizing agent in calico printing for discharging aniline black, alizarine dyes, aniline dyes and indigo. In discharging alizarine and aniline dyes on cotton, it is usually combined with chlorates but when used as an indigo discharge, it is combined with alkalies such as magnesia or sodium silicate. In some cases it is used for the production of Turnbull's blue as a ground on souple silks, in which case it is combined with some ferrous salt.

HYDROSULPHURIC ACID. The sodium compound of this acid is used as a solvent and assistant in the application of the sulphur colors to cotton. The copper salt (copper sulphide) is used as a carrier of oxygen in the production of aniline black on cotton because of its great affinity for oxygen and the readiness with which it again gives off the oxygen to certain other substances. It must be kept moist with water and preserved in the form of a paste.

HYPOCHLOROUS ACID. The bleaching powder used in the bleaching of cotton is known to chemists as calcium hypochlorite. This compound is also used for preparing wool previous to printing, for giving to wool the "silk scroop," and for the production of cotton yellows that are fast to chlorine. The latter article is produced by after-treating primuline dyeings with solutions of chloride of lime.

NITROUS ACID. The sodium salt of this acid is used in the diazotizing bath with such colors as diaminogen black, dianisidin blue and paranitraniline red. When treated with hydrochloric acid or sulphuric acid it is decomposed and the nitrous acid is set free. If this operation were omitted the phenols (developers) would not be attracted to the fiber at all.

VANADIC ACID. The ammonium salt of this acid is used as a carrier of oxygen in the aniline black process. It is comparatively expensive but the quantity required is far

less than when other agents are used. It is in many cases replaced by copper sulphide, copper acetate, or ferrous sulphate. A solution containing one gram of the ammonium vanadate will as a rule suffice for the oxidation of 200 kilograms of aniline salt.

SILICIC ACID. The waterglass used in the weighting of silk is termed by chemists as sodium silicate. It is useful in this process as it makes possible the production of exceptionally high "weightings." The treatment with sodium silicate occasionally gives rise to spots, but these can as a rule be removed by ammonia. Waterglass is sometimes added to the boiling-out liquor in the cotton bleaching process, because of its weak alkaline nature and the assistance it renders in the removal of dirt and foreign matter. Another use to which this material is put is in the preparation of fireproof fabrics for theater decorations.

TUNGSTIC ACID. The sodium compound of this acid is used for rendering decorative textiles fireproof. It was at one time used for weighting silk, whereby about 15 per cent. can be added to the weight of the material.

THIOSULPHURIC ACID. The "hypo" which is sometimes used by cotton bleachers as an "antichlor" is the sodium salt of this acid. It is used in this case as it is capable of reacting with an free chlorine which may be in the goods and so rendering it harmless. The hypo bath is used then in place of the acid bath or the "bisulphite" bath.

PHOSPHORIC ACID. This acid is used in the form of its sodium salt in the tin-phosphate-silicate process for weighting silk. It serves to fix the tin oxide by converting it into tin phosphate. The bath used for this purpose should stand at about 6 to 15 degrees Twaddell.

Sodium phosphate is also used as a fixing agent for the aluminium mordant in the dyeing of turkey red. In this instance it is used to replace the cow and sheep dung baths of the original process. Its use in calico printing in connection with the benzidene dyes depends upon its "brightening" effect.

PRIZE CONTEST LETTERS.

A CARDER'S TROUBLES.

BY J. C. TIPTON.

Much has been written about a carder's troubles, but it can be safely said that "The half has never yet been told." Carding is conceded to be the most important process of textile manufacturing. Good carding is the foundation of first-class cloth making, and there is very little or no chance of correcting defective work after leaving this department.

But a carder generally has his troubles in making good carding. Nearly every carder will differ to some extent on some important points, and so will every other man connected with textile manufacturing. One of the first troubles that a carder experiences is with the class of cotton he is given to process. This is a most important point for consideration and one that is very often given little or no attention. Cotton should be graded for all classes of work according to the staple, strength and color. In most mills of 20,000 to 30,000 spindles, a carder has little or no voice in determining the grade of cotton he is to use. One day he will receive all good clean cotton, and the next day the staple may be an off grade, rather yellow and dirty, and probably the next will be all compressed, making as a whole an unsatisfactory stock to run. As this kind of stock proceeds through the mill, and the yarn begins to show the effects of the mixture and the work is running badly, the responsibility for these conditions will be placed at the door of the card room. The trouble generally begins when the weaver complains that he is getting bad yarn from the spinning room. The spinner will say that the carder does not deliver satisfactory roving to him, and consequently the yarn made is inferior.

Then the carder has his turn at making explanations. He will tell his side of the trouble and say that he couldn't make black cotton white, and weak cotton strong, etc. Then he will go to the yard man in charge of sending the cotton into the opening room, and tell him that he must have better mixings, and the yard master will say that he is giving him the best he has and that he was ordered to use all this lot before using any other.

Let us suppose that the cotton is satisfactory, and we find that uneven work is being made. Upon examination it is found that the card drawing is very uneven. It is then in order to go back to the picker room and make a thorough examination. You will probably find that the automatic feeders are not working uniformly, one is feeding light and the other heavy. It may also be found that some of the driving belts are slack and slipping. These troubles are attended to as they are found and we proceed to the intermediate lappers. Here we weigh the laps and find them to be varying beyond reasonable limit. This irregularity is adjusted and after going over the finishers and adjusting all parts, and tightening all belts we have the picker room in good shape, making good even laps.

It would seem that all of the troubles had been found and remedied and that everything should move along without any complaint for a while. But not so; the spinner brings down a sample of cut yarn and askes you to examine and see if you are not making cut work. We go to the drawing frames and find that some of the weights are off of the rolls or that a lap has been made on some of the rolls, which, of course, makes cut work. An examination of all of the roving machinery will probably show that some of the rolls are dry and need oil, or are dirty and have chokes in them. The lesson to be learned from all of the troubles mentioned is to have all of the machines under some watchful eye, and thus catch these different irregularities before any damage is done.

NEW COTTON IN THE MILL.

BY CHAS. H. EDMONDSON.

The first bales of a new cotton crop are always a source of more or less worry for a superintendent of a cotton mill, and more especially is this the case with the overseers. They know that it will not run as well as the old cotton, especially on the cards, that the per cent. of waste is

greater than with seasoned cotton, that there will be some doubt as to the breaking strength of the yarn, and that there will be a fluctuation in the roving yarns.

For the past three or four years the writer has run a sample of the new crop at the beginning of each season, noting carefully the general run of the work and also the percentage of waste made in the card room. A sample of the 1909-10 crop has just been finished, and the results of the test are given herewith:

One hundred pounds were taken from each of ten bales of new strict middling cotton, mixed well and fed to the hopper of the breaker picker, the picking machinery being cleaned beforehand. The new cotton was passed through the three pickers and the waste was collected and carefully weighed.

Total amount of cotton used	1015.5 lbs.
Total weight of finished laps	988.0 lbs.
Loss in weight	27.5 lbs. or 2.7 per cent.

This waste was collected from the different machines as follows:

Breaker picker	13.5 lbs.
Int. picker	6.5 lbs.
Fin. picker	6.0 lbs.
Unaccounted for	1.5 lbs.
Total	27.5 lbs.

The finisher laps were then carded on seven Lowell 45-inch cards, the latter being thoroughly cleaned and stripped before the laps were run. Only two of the cards were used in finding the waste which was as follows:

Weight of the two laps carded	91.25 lbs.
Weight of the finished rove	86.75 lbs.
Loss in weight	4.50 lbs. or 4.93 per cent.

This 4½ pounds collected from the two cards was found to be distributed as follows:

Flat, cylinder and doffer strips	3.00 lbs.	3.28 per cent.
Scavenger, fly and motes	1.25 lbs.	1.38 per cent.
Unaccounted for	.25 lbs.	.27 per cent.
Total	4.50 lbs.	4.93 per cent.

The cotton was then run through two processes of drawing, the finished drawing being geared for a 72-grain sliver. I found the new cotton to be about six grains light, and after changing the draft gear, I secured a 71.4-grain sliver. This was then run on a Lowell slubber, geared for .47s hank; I found that this was also a fraction light. No change was made and the roving on the speeder was found to be exactly right, or 1.50s bank. This roving was then spun on a Lowell spinning frame, for No. 12s warp yarn and a sizing of 28 bobbins gave an average of No. 11.59s with a breaking strength of 177.2, nearly half a number heavy and the breaking strength high.

A few words concerning the general run of the work may be of interest to the many who are troubled when running new cotton. Further describing the sample used, it may be stated that the cotton was not damp, but it was easily noticeable that the same contained more moisture than old cotton. A 75-pound sample dried out 9.7 per cent. at a temperature of 115 degrees Fahrenheit, while a sample of old cotton dried out 5½ per cent. Of course, that was rather a severe test, and cotton is never subjected to such a high temperature in the mill; but the experiment showed clearly the relative per centage of moisture in the two samples.

The waste on the picking machinery was rather low, probably owing to the fact that the fibers had a tendency to cling to the light foreign matter, more so than with old cotton. Green pieces of leaf and a small amount of trash were retained throughout the process, a considerable amount being knocked off by the rollers of the spinning frame.

The finisher laps averaged about a pound and a half heavier than the laps made from old cotton, and from observations I would recommend making the laps fully a pound heavy, if not more, when all new cotton is used. This will save continual changing on the drawing and roving frames, for it is a fact that the roving will get lighter in the card room. The work ran very well except on the card; here the web was cloudy and the end hard to keep up, the weather being very dry. The doffer comb was raised a small amount, which made the ends stay up fairly well.

The writer has noticed time and time again that with all new cotton, if the speeder roving is of the correct weight, the spinning will be heavy and the goods will almost invariably be light. This condition is explained by the fact that on the spinning frame the rolls do not draw out the new cotton roving nearly so well as they do with the old seasoned cotton. The damp fibers do not seem to glide over one another as easily as the well-dried glossy staple. This causes the spinning yarn to be heavier, because a speeder bobbin of old cotton will make more hanks of yarn than a bobbin of new cotton. After being spun and subjected to the heat of the spinning room for several days, the yarn will dry out, and the cloth will be light. About the best remedy for this is to have the speeder rove slightly heavier than the layout calls for.

Sometimes when old and new cotton are mixed together kinky filling will be the result. This is often the case, and when the weaver shows it to the spinner, the latter is puzzled and can not account for it; he knows very well that the twist has not been changed.

This trouble showed up to some extent at a mill in one of the weave rooms some time ago. It was soon traced back to the same cause that makes new cotton spin heavy, that is, the staples from the old and new stock do not draw evenly on the spinning, and of course it will have a tendency to twist in the weak places and so form kinky filling in the weave room.

This fault is usually a slight one though, and the writer would not recommend any change in the lay out to remedy this defect.

ALIGNING AND LEVELING A COTTON MULE.

BY W. E. WILLIAMS.

If the mule has been in operation and is to be gone over, let off all of the bands, then remove the top rolls and front steel rolls, and uncouple the roller beam at the headstock. Now level the head both ways, and see that both mule ends are the same after getting the ends set straight and level, one with the other. Run a line from one end of the mule to the other, through the front stands, leveling the line in the center of the stands and having a small block in each end stand to hold the line slightly up. This line will indicate very quickly if the head is in line or not, and if not, which way it should be moved.

After getting the head level and straight, go over the roller beam and level to the same line by raising or lowering the sampsons and moving the stands in or out as required. Some old mules are so badly out of plumb that the sampsons have to be moved by taking up the lag screws and replacing them after the beam has been set right.

Each track should be leveled separately and then one to the other. This may be done by getting a stick long enough to reach from the roll beam to the track at the head end, and setting all of the tracks by this stick from the beam, then leveling the track and leaving the beam end where it has been put. This will put them level one with the other.

The carriage may be leveled by putting a small spirit level crossways in the bottom of the carriage and raising or lowering the screw plates at the spiders until it is level. Remove the cylinders; go over all of the couplings of the carriage; tighten all bolts; take off the faller stands at the mule ends, and have two small pieces of board, say about three inches by three feet with a hole in one end and a slot in the other, and bolt them to the ends where your faller stands belong, extending downwardly in front of the carriage. Run a line from one of these boards to the other, passing it through the slots in the ends, and then by getting the distance from the line to the carriage you can tell if the latter is straight. If it is not, make use of diagonal rods to get it so, being careful to leave all of the rods taut.

After the carriage is straight, remove the line and boards and get three long boards all of the same length, and bolt these to the sampsons, affixing the other ends to the back of the carriage by means of screws in such a way as to hold the carriage perfectly steady. You are now ready to level the spindles. Bolt some small boards on the end of carriage where the bracket for squaring band belongs, and run a line on these the same as for straightening the carriage. Bevel the spindles according to requirements, aligning them at the same time and not attempting to get them absolutely right the first time, but going over them two or three times.

Next remove the line, get all of the bands to their places, release all of the stops, and draw the carriage up to the beam, to the point wanted, which should be about three inches from the beam, and set the stops. Now level the spindle tops to the roller beam, or to use a commonly accepted term, top the spindles. It is sometimes found necessary to pack under the bottom of the spindle rail with thin strips of wood between the tracks in order to get spindle points level.

Now run the mule out half way and level and line the cylinders. This is a point at which many mule men make a grave mistake; they line and level the cylinders and fallers before topping the spindles, and of course when the latter operation is accomplished, the cylinders and fallers are thrown out of line again. I have worked with men who had been in the mule room twenty or thirty years and who would invariably do it that way. I have also seen men, who after just beveling the spindles and were going to top them, wonder why it was that they could not get the weight on the carriage wheels equally distributed on both sides of the head. In other words one wheel would not have as much weight as the others. It is very simple if they would stop to think that they had not leveled the head itself which was higher on one side than on the other.

MARKET REVIEWS.

MONTHLY REVIEW OF THE COTTON MARKET.

BY H. & B. BEER, NEW ORLEANS.

The more that is learned of this season's crop, the smaller it appears to be. In our review for last month we stated, as an introduction, that after having advanced to near the 15 cents level for middling cotton in the local market, due to the world having at last accepted the idea that the indicated crop was about 11,000,000 bales, there appeared to be a more conservative tone of the market pending further developments. Subsequent developments, however, have proven the crop to be smaller than estimated one month ago by about 500,000 bales; this influenced renewed buying and made new high record values for the season.

The movement to market, which we predicted would soon show a marked falling off, has actually been lighter than calculated upon. The amount of cotton marketed during November was only 1,941,000 bales compared with 2,595,000 one year ago, and arrivals at the ports were so small for the first three weeks of December that the amount brought into sight during December made one of the smallest movements for December for the past twenty years, being about 1,400,000 bales against 2,364,000 in 1908. The total amount marketed to the first of January was about 7,202,000 bales compared with 8,711,000 to the corresponding date last season, or about 1,500,000 less.

The smaller receipts than expected during November made the believers in the smaller of the crop estimates more confident in their opinion that the bureau crop estimate of December 10th, would not promise a growth in excess of 10,250,000 bales. The quantity of cotton ginned to December 1st—8,878,000 against 11,008,661 bales on year ago—was referred to more than anything else as making it probable that the Bureau estimate would be in keeping with smaller crop views, it being claimed in the South that about 87 per cent. of the crop was ginned by December 1st, against 84.1 per cent. last year. This was about as good an indication as could have been had, the government estimate of 10,088,000 bales being indicative of 88 per cent. of the crop having been ginned to the close of November. Finally the official figures were made public and were accepted in America as being approximately correct.

Not so in Europe; traders abroad were inclined to discredit the government's estimate, cabling that it pointed to a commercial crop of at least 11,000,000 bales. Meanwhile the markets were in suspense, in a rut, so to speak, and as the holidays were approaching, which is a usual dull period in cotton, extensive liquidation of long cotton took place and there was not a little short selling for European account on the theory that a reaction was due. Spinners of the world bought sparingly, and for the want of an urgent demand for spots and for futures, the mar-

ket did suffer a reaction of about 40 points, or about $2 per bale. Southern spot holders refused to meet the decline, and there was a gradual steadying of the market.

The foreign element expected the census report, issued December 20th, to prove the government's estimate incorrect by showing more cotton ginned than looked for. The National Ginners' Association issued a report estimating 9,429,000 bales ginned to December 13th. These figures were found to be too high. The census reported only 9,362,000 bales ginned to December 13th compared with 11,900,000 bales one year ago, or only 484,000 bales for the last period, December 1st to 13th, compared with 941,000 for the corresponding period of last year. These figures were looked upon as about in keeping with the bureau's crop estimate for an actual growth of about 10,088,000 bales, which, after including linters, etc., pointed to a commercial crop of only 10,300,000 bales against last season's commercial crop of 13,826,000 bales, a shortage of about 3,500,000 bales. This having put an end to estimates for a crop of 11,000,000 bales and over, offerings on the market became scarce. Europe began to cover to some extent.

There developed more demand for spot cotton for account of domestic and foreign account. It was realized that if the crop should be anything as small as the bureau's estimate, or say not more than 10,500,000 bales, that higher prices still were inevitable owing to the probability of the supply being inadequate to meet the world's requirements, even on the present basis of consumption, which has been curtailed about 5 per cent. so far, as the indicated crop points to about 25 per cent. less than last year's yield. In this connection the following figures, in so far as the available balance of the season is concerned, will be found interesting, and perhaps valuable:

	1909	1908	1907
Estimated coml. crop ..	10,300,000	13,826,000	11,572,000
Marketed to Dec. 17th..	6,539,000	7,755,000	5,789,000
Amount of cotton yet to be marketed	3,761,000	6,071,000	5,783,000
World's vis. of Am. Dec. 17th	3,777,000	4,244,000	3,470,000
Total available bal. of..	7,538,000	10,315,000	9,253,000

THE YARN MARKET.

The yarn market during the first half of last month continued to show the same unsatisfactory condition that has characterized this department for some months. The only change noted was that spinners were inclined to make small concessions from prices quoted at the end of November, but this show of willingness to do business was met with very little encouragement by the buyers who exhibited practically no interest in the new position of the spinners. This position of the buyers was due in a large measure to the sagging tendency of the price of cotton at that time, as buyers generally conclude that they can safely await further concessions at such a time, with some assurance of profiting by that method.

The tone of the market was irregular more or less throughout the month, which was particularly marked during the first two weeks. There was no regular variation in price of the different numbers, as each sale was a specific transaction and depended either upon the urgency of the spinner to sell, or upon the buyer to fill his requirements. As a result some numbers sold at a higher price than finer yarns with less sale, and vice versa. The spinners have been holding out consistently for higher prices and as a consequence orders were not received in sufficient quantity to take care of the production. Spinners have not been consigning this surplus yarn, hoping that conditions would improve in a short time; and for the same reason they have not curtailed to the extent that the exegencies of the situation demand. The supply of stock yarn that has for a long time been in evidence at lower prices than spinners' quotations, is gradually being reduced and its exit from the market will have a stimulating effect, providing the mills can hold their surplus until this condition is a reality.

During the latter part of the month some very good business was put through in some counts of yarn, and as the price of cotton advanced, the spinners reflected this movement by higher quotations. It may be said that the third week showed a better tone in the market than had been noted for some time, despite the usual year-end dullness. Buyers were inclined to operate to an extent which was a very encouraging sign, and will undoubtedly lead to a more and more satisfactory condition, provided the spinners do not attempt to advance prices. It is a fact that the stocks of the buyers are diminishing rapidly and they will soon be in urgent need of new supplies, and on the other hand spinners need the orders, so that it is entirely reasonable to suppose that the way will be made for them to transact some business.

THE KNIT GOODS MARKET.

The season was opened for the heavy weight cotton ribbed lines about the first of December, and the well known lines sold as rapidly as was anticipated. Prices of goods made by mills with extensive reputations were higher than last season, but excellent purchasing was made by jobbers, and one or two lines were sold up in a very short time.

Very favorable business was noted on the lines of fleeced underwear for next fall that had been opened up, and many of the lines were making excellent records. The alacrity with which the jobbers have placed orders would seem to indicate that they are alive to conditions in the cotton and yarn markets, and are convinced that the trend of prices is distinctly upward.

It is believed by many well informed men that almost all of the mills with the exception of a few large ones, have not sufficient yarn on hand or ordered to carry them through June, as they have been playing a waiting game in the yarn market. In the event of a further advance in the yarn market, and with contracts to fill, these knitting mills will find themselves in a very unenviable position. The obvious result will no doubt be a more or less unstable market during the summer, with the jobbers having their hands full to get proper deliveries.

Cotton hosiery for fall wear had a very satisfactory business during the month at advanced prices. Large factors are making some inquiries for the cheaper lines of fall cotton, owing largely to advanced price of cotton. When the government report of cotton ginned was issued during the month indicating the extent of the shortage, many of the lines previously opened were temporarily withdrawn from the market. Slight advances were made on most of the hosiery lines that had been withdrawn from and returned to the market. These advances dampened the enthusiasm of buyers, and jobbers at the end of the month showed little disposition to operate to any great extent.

PRICE CHANGES OF SOUTHERN COTTON MILL STOCKS.

BY F. C. ABBOTT & CO., CHARLOTTE, N. C.

The following list of leading Southern cotton mill stocks shows the quotations in January 1909, and December 1909, giving the net changes during that period. On a number of stocks there has been quite a stiff advance, while the declines shown in others are due in many instances to enlarged capitalization. The tendency, however, in the stronger and better managed mills is constantly upward, and as soon as the mills are thoroughly adjusted to the high price of cotton now prevailing, we believe that many more of them will show a larger value in their stock quotations.

Mill	Jan. 1909.	Dec. 1909.	Net Changes
Aiken	75	91½	+16½
American Spinning	146	155	+ 9
American Spinning, pfd.	103	100	— 3
Anderson	66	57½	— 8½
Arcadia, S. C.	92	91	— 1
Arlington	150	140	—10
Atherton	98	98	.....
Avondale Mills	115	120	+ 5
Belton	114	120	+ 6
Bloomfield	118	110	— 8
*Brandon	135	97	—38
Cabarrus	110	125	+15
Chadwick-Hoskins	90	100½	+10½
Chadwick-Hoskins, pfd.	102	102	.....
Clinton	125	125	.....
Clifton, com.	102	105	+ 3
Clifton, pfd.	100	103	+ 3
Cliffside	155	194	+39
Chiquola	130	165	+35
Courtney	95	95	.....
Converse	117	108½	— 8½
Columbus Mfg. Co.	95	95	.....
Cora	130	130	.....
Darlington	70	80	+10
Dallas, Ala.	95	100	+ 5
Eagle and Phenix	120	125	+ 5
Easley	150	175	+25
Enoree	70	68	— 2
Erwin, pfd.	100	100	.....
Florence	130	132	+ 2
Gaffney	68	80	+12
Gaston	100	100	.....
Gluck	93	97	+ 4
Gainesville	49	60	+11
Gibson	95	80	—15
Glenwood	115	143	+28
Graniteville, S. C.	160	160	.....
Gray	120	120	.....
Grendel	115	112	— 3
Greenwood	97	72	—25
Highland Park	165	185	+20
Highland Park, pfd.	102	102	.....
Hartsville, pfd.	100	100	.....
Henrietta	165	175	+10
King, John P.	90	95	+ 5
Kesler	135	125	—10
Laurens	150	135	—15
Lancaster, com.	125	130	+ 5
Langley	90	96	+ 6
Linden	125	94	—31
Limestone	140	175	+35
Loray, pfd.	93	95	+ 2
Lowell	195	200	+ 5
*Lumberton	225	250	+25
Manchester Mills	100	110	+10
Mills Mfg. Co.	100	100	.....
Modena	125	108½	—16½
Molohon	98	110	+12
Monaghan	110	134	+24
Monarch	98	106	+ 8
Marlboro	75	88½	+13½
Newberry	146	120	—26
Norris	115	125	+10
Olympia, pfd.	71	85	+14
Orr	105	102	— 3
Ozark	125	127½	+ 2½
Pacolet, pfd.	98	100	+ 2
Pacolet, com.	130	101	—29
Patterson	130	110	—26
Piedmont	171	176	+ 5
Pelzer	160	152	— 8
Poe	132	167	+35
Pell City	95	86	— 9
Pell City, pfd.	100	100	.....
Saxon	126	126	.....
Sibley, Ga.	60	65	+ 5
Social Circle	99	99	.....
Statesville Cotton Mills	107	110	+ 3
Tucapau	200	250	+50
Toxaway	94	91	— 3
Union Buffalo, 1st pfd.	55	73	+18
Union Buffalo, 2nd pfd.	17	18½	+ 1½
Victor	125	135	+10
Walhalla, S. C.	74	62	—12
Warren	92	93½	+ 1½
Warren, pfd.	103	108	+ 5
Washington	25	30	+ 5
Ware Shoals	70	90	+20
Washingon, pfd.	110	105	— 5
Watts	101	88	—13
*Wiscasset	130	125	— 5
Whitney	125	121	— 4
*Woodside	103	96	— 7
*Woodside, pfd.	100	95	— 5
Williamston	103	114	+11
Woodruff	115	145	+30

*Mill enlarged during the year and new stock issued.

REVIEW OF THE NEW BEDFORD MILL STOCK MARKET.

BY SANFORD & KELLEY.

The financial review of the general business of New Bedford, Mass., for the year 1909, is indeed gratifying and encouraging to our people. It shows a far greater number of new cotton mills being erected here than ever before, requiring the expenditure of nearly ten millions of dollars, which is far more, we believe, than was ever expended in one year in any cotton centre in this country. Five new corporations were formed having a combined capital of $5,912,500, and $500,000 of bonds—the New Bedford Cotton Mill Co., capital $250,000 common stock and $750,000 preferred and $500,000 of bonds; the Holmes Mfg. Co., $600,000 common stock and $600,000 preferred; the Nashawena Mills, $2,500,000; the Pierce Brothers, Limited $700,000, and the Anderson Textile Mfg. Co. $12,500. The following increased their capital stock; Dartmouth Mfg. Co., $600,000 common and $600,000 preferred, and $350,000 of bonds; Gosnold Mills Co., $275,000 common and $275,000 preferred; Nonquitt Spinning Co., $1,200,000; Soule Mill, $210,000; and Whitman Mills, $500,000. The Crescent Mfg. Co., increased its capital stock from $19,000 to $65,000.

The new and old companies erect ten new mills, giving, when completed, employment to about 6,200 more operatives, which, with their families and those who always follow as mechanics, store-keepers and laborers, will increase our population by at least fifteen thousand, bringing the number of inhabitants up to about 112,000. New Bedford is at present growing faster than any other city in New England.

Mills in New Bedford use about 260,000 bales of cotton annually, and when the new mills are in full operation will use nearly 310,000 bales annually. New Bedford continues to rank first in the United States in the manufacturing of

fine cotton goods and fine yarns, and second in the number of spindles in its cotton manufactories, and we are rapidly approaching first place in number of spindles.

The new mills, with the additions to the old, increase the spindles by 24 per cent. While the earnings of the mills in 1909 for various reasons are not as large as in 1907 the banner year, they have been good, and dividends from those earnings and from the accumulations of previous years, have brought the total up to a larger amount than in any previous year. The outlook for the general business of our city for 1910 is good, though because of the shortage of the cotton crop, which may lead to curtailment of product, it is possible net earnings of the mills for 1910 may not equal in percentage those of 1909.

Before the ending of the year 1910 New Bedford cotton mills will have in operation 2,647,843 spindles, an increase of 510,032, or 23 9-10 per cent., which comes from installing new mills and additions in those already in operation. The Dartmouth Mfg. Co., added 73,408 spindles; Nonquitt, 70,000; Page, 12,624; Taber, 10,800; and Whitman, 50,800. The new mills install as follows: Anderson Textile Mfg. Co., 2,000 spindles; Holmes, 50,400; Nashawena, 125,000; New Bedford Cotton Mills company, 65,000, and Pierce Brothers, Limited, 50,000. The number of looms is 50,698, an increase of 12,637, or about 33 1-5 per cent.; Dartmouth adding 1,500; Gosnold Mills, 1,416; Page Mill, 518; Soule Mill, 300; Taber Mill, 246; and Whitman, 1,600. The new mills install: Nashawena Mills, 4,100; New Bedford Cotton Mill Co., 1,200; Pierce Brothers Limited, 1,350. The operatives number 27,717, an increase of 6,197, or about 28½ per cent. The number of mills is 60, an increase of 10.

New Bedford cotton manufacturing corporations paid in dividends in 1909, an aggregate amount of $2,992,062.50, against $1,798,595 paid in 1908, an increase of $1,194,467.50, or about 66 4-10 per cent. In 1907 the total dividends paid amounted to $2,489,750, but that was a phenomenal year. In 1909 the Acushnet paid its regular dividend of 16 per cent.; the Bristol 6 per cent.; Butler, 9 per cent.; City, 16 per cent.; Dartmouth, 100 per cent., extra from accumulations of past years, and 12 per cent., regular dividends on its increased capital. It also paid a quarterly dividend of 1¼ per cent., on its new issue of preferred stock. Gosnold paid 6 per cent. on its preferred stock; Grinnell, 8 per cent; Hathaway Mfg. Co., 10 per cent.; Kilburn, 6 per cent.; Manomet Mills, 8 per cent.; Nonquitt, 8 per cent. on its old stock; Page, 5 per cent.; Pierce, 16 per cent.; Potomska Mills, 6 per cent.; Soule, 24 per cent. on $1,050,000, and 4 per cent. on $1,260,000; Wamsutta Mills, 6 per cent.; Whitman, 37 1-3 per cent. on $1,500,000, and 5 per cent. on $2,000,000; Beacon Mfg. Co., paid regular 6 per cent. on common and preferred stocks and an extra of 1½ per cent. on each stock, and will in the future pay quarterly dividends at the rate of 6 per cent. per annum on the preferred stock.

The local stock market was more active throughout the year than for years, and through the demand at home and outside, prices advanced to a surprising extent. Most of the mill stocks sold higher than ever before, holding well the advance to the end of the year, with the market almost bare of the dividend payers—in fact, there are few shares of either the old or new corporations offering. The demand was healthy and largely for investment, and came from almost all parts of our country. The highest sale prices of the year compared with the lowest, show the following advances:

	1909 High	1909 Low	Net Change	Div. Rate.
Acush. Mills	360	342½	+17½	16
Anderson Textile Mfg. Co.	100	100	.....	....
Beacon Mfg. pfd.	111	105	+ 6	7½
Bristol Mfg.	150	117	+33	6
Butler Mill	175	146	+29	9
City Mfg. Co.	253	225	+16	16
Dart. Mfg. Co.	300	217½	+82½	12
do. pfd.	106	103	+ 3	5
Gosnold Mills	No sales.		.....	....
do. pfd.	113½	105	.....	6
Grinnell Mfg. Co.	250	210	+40	8
Hathaway Mfg. Co.	No sales.		.....	10
Holmes Mfg. com.	102	100	+ 2	....
do. pfd.	103	100	+ 3	....
Kilburn Mills	195	160	+35	6
Manomet Mills	138	132½	+ 5½	8
Nash'wena Mill	107	102½	+ 4½	....
N. B. Cotton Mill Co. com.	No sales.		.....	....
do. pfd.	101	100	+ 1	....
Nonquitt Spinning Co., old.	132	112	+20	8
do. new	128	121	+ 7	8
Page Mfg. Co.	130	121	+ 9	5
Pierce Mfg. Co.	No sales.		.....	16
Pierce Bros., Limited.	No sales.		.....	....
Potomska Mills	137½	130	+ 7½	6
Soule Mill	175	130¼	+44¾	8
Taber Mill	127	91	+36	....
The Crescent Mfg. Co.	115	100	+15	5¾
Wams'tta Mills	142½	127½	+15	6
Whitman Mills	225	150	+75	9

REVIEW OF THE FALL RIVER MILL STOCK MARKET.

(*Contributed exclusively to* COTTON).

BY G. M. HAFFARDS & CO., FALL RIVER, MASS.

With the closing of the year, a review of the course of cotton mill stocks will undoubtedly prove both interesting and profitable to the large body of investors in Fall River properties. Cotton manufacturing has enjoyed another season of prosperity, as indicated by the annual returns of the several corporations, which generally show an increase of surplus and added amount expended for improvements of machinery. In addition to this, disbursements for the year were much in excess of those of 1908, being $1,971,352 as against $1,741,135 for 1908.

Extra dividends were paid by the following Fall River mills: Union Cotton Mfg. Co., 23½; Cornell Mills, 10 per cent.; Hargraves Mills, 1 per cent.; Parker Mills, 1 per cent.; and Seaconnet Mills, ½ per cent.; Troy Cotton & Woolen Mfg. Co. paid an extra dividend in bonds to its stockholders, amounting to $300,000; and the Davis Mills one of 25 per cent. amounting to $250,000.

The Shove Mills reduced their bonded indebtedness by $100,000 having called in $50,000 and bought $50,000 additional bonds in the open market. The Barnaby Mfg. Co., entered the dividend list after a lapse of a period of six and one-half years, paying its initial dividend in the July quarter of 1 per cent.

These evidences of prosperity have caused an enhancement of value on an average of $10 per share, which in some individual cases, this figure has been much exceeded, as for instance in the case of the Union Cotton Mfg. Co., the stock advanced $40; Hargraves Mills, $40; Parker Mills, $32.50; Sagamore Mfg. Co., $20; Cornell Mills, $20; Chace Mills, $18.50; Arkwright Mills, $14; Bourne Mills of $13; Shove Mills, $21.50; and Seaconnet Mills $14. While some

stocks are now selling at practically the same level as a year ago, others have advanced from $4.00 to $10.00 per share each.

Another feature in the Fall River market and one which has occurred for the first time in many years, is the fact that at one period there were no stocks, with the exception of one uncompleted plant, which could be obtained at less than $100 per share; also with this exception, there were none of the stocks but what were on the dividend list. There has been an increase of from 160,000 to 170,000 new spindles caused by the increases of the new Flint Mills, Sagamore Mfg. Co., and Davis Mills, and other minor additions made by many. The results therefore achieved for the year can be looked upon with much satisfaction by both the management and the investing public.

While the conditions ahead do not appear as satisfactory for a continuation of a period of prosperity as at this time last year, on account of the tremendous rise in cotton, yet with the plants in the best of physical and financial condition and with ability of a high order in the management of the corporations, we see no reason why the Fall River properties should not continue to be looked upon in the very highest regard by the investing public.

The Textile Mill Situation in the South and New England.

SOUTHERN MILL SITUATION.

(Special Correspondence.)

One of the most interesting reports of the past month was that which told of the plans of the Duke interests to establish in the neighborhood of Charlotte, N. C., 21 of the biggest cotton mills in the country. According to the rumor the Southern Power Co. a ten-million dollar electrical development concern with headquarters in Charlotte, in which the Dukes are largely interested, is endeavoring to locate along its power sites a strong of big cotton mills. It will be recalled that some weeks ago, Robt. S. Mebane and associates organized a $600,000 mill to be located at Great Falls, S. C., where one of the Power Co.'s large power plants is in operation. It was said then that this was only the first of a series of gigantic cotton manufactories which would be located in the vicinities of other power plants, and which would avail themselves of electric power.

The Southern Power Co. is one of the largest concerns of its kind in the United States, and when its various power sites in the Carolinas are developed it will have available over 200,000 electrical horse-power. So far, as rapidly as this power has been placed on the market it has been contracted for by mills and other manufacturing plants. This report goes to indicate that the new mill construction record of the South for the coming year will be up to the high standard set in the past year, which was a record breaker. Over $26,000,000 were expended in new mill properties, and it looks as if the organization of new mills will keep up this active pace.

Southern cotton manufacturers are facing a serious situation. It seems to be the general impression that the price of the raw material will not fall for some time lower than present quotations, and indications point to still further advances. One manufacturer expressed his opinion of the situation in a nutshell when he said that with cotton at 14 cents, mills could only make a bare profit with present quotations on cotton goods; and as they now have to buy at a higher figure, they could only run at a loss. Some mills have supplies of cotton sufficient to run for some time, but those having to buy to fill present requirements are facing the necessity of closing down unless there is speedy improvement in the prices offered for manufactured goods. Realizing this mill men have decided to meet in Charlotte, N. C., on Janunary 4th, to consider plans for bringing about an improvement in prices.

Secretary T. W. Crews, of the Southern Hard Yarn Spinners' Association has issued a call to mills to meet at Charlotte on the date mentioned, and there is every indication that the meeting will be largely attended. It is believed this is the most important meeting of manufacturers held for some time, and it is probable that some definite plans of concerted action will be agreed upon. Whether or not the mills will decide to curtail more heavily, close down temporarily or take other measures is problematical.

More than forty prominent manufacturers have answered the call, and will be in attendance. There will also be many commission men from New York, Philadelphia, Providence, Boston and other cities. It is estimated that there will be at least 200 manufacturers and commission men in attendance. The meeting is not under the auspices of either the hard of soft yarn spinners' association, but is to be a general meeting of manufacturers. Presidents of the various organizations will request their members to be present and take part in the meeting.

NEW ENGLAND MILL SITUATION.

(Special Correspondence.)

The year 1909 closed with many serious problems confronting textile manufacturers in the New England States, and a solution of many of these question is as remote as it was three months ago. There is hardly a textile manufacturer that does not welcome the new year with open arms, because of the strong probability that during the next six months many of the perplexities hanging over the market will be eliminated.

The manufacturer who had foresight and courage to buy cotton one year ago this month when middlings were quoted at 9.70 in New York, or during the early spring months at 10 cents per pound, is making a mint of money for his stockholders. His neighbor who was not so fortunate as to cover his 1909-1910 requirements is paying prices for cotton that compels a loss on every yard of cloth manufactured, if of the coarser and medium counts, while the finer counts are making a very modest profit. It is estimated by reliable cotton mill men that about 15 per cent. of the mills in the New England States were covered with cotton, at very much lower prices, through to next season's crop; 20 per cent. are covered for about half the year and the balance are buying new cotton at current quotations, and have been doing so right through the high-price season.

The year just ended will prove a "prince or pauper" year to New England textile corporations, and when annual reports are compiled there will be many surprises in store for stockholders of mill shares. It is entirely probable that during the next three months there will be some violent price changes in the textile list of the shares, and the sober virtuous textile mill share market will make some of the New England stock exchange speculators take notice.

Men who are well posted on the selling end say that annual inventories by retailers and jobbers will show the smallest stocks of goods on hand than for many years. This fact alone is probably the brightest ray of hope in the textile industry, and will do more toward readjusting values than any other condition. That there will be greater buying of fabrics is generally conceded, and that "at value" prices will prevail is conservatively believed, providing manufacturers maintain a firm determination not to shade prices in order to keep their looms running. A very large number of fine goods mills have established "at value" quotations and are getting their share of business. At a meeting of duck interests during the latter part of December this subject was vigorously discussed, and a partial agreement reached, although the duck market is in rather bad shape to stand an increase in price on account of quite an accumulation of stock of the heavier numbers.

It is inconsistent for commodity prices in general to advance from 20 to 50 per cent., and hold cotton fabrics down by sheer force and not allow cotton manufacturers to make a new dollar for an old one. Butter has risen 40 per cent. in the last eighteen months, cheese 30 per cent., eggs 100 per cent., wheat and coffee 15 per cent., flour 20 per cent., lard and pork 55 per cent., all kinds of leather and leather products from 10 to 30 per cent., and yet retailers and consumers positively refuse to buy cotton fabrics at a proportionate advance with the raw material. Raw cotton has advanced 50 per cent. in one year, while the average price of 20 representative classes of cotton goods has advanced but a trifle over 10 per cent.

As usual, December, was a quiet month. Prices held strong in the print goods' market because of the buying of Mr. Borden who cleaned up each week's accumulation of Fall River print goods at satisfactory prices and bid current quotations for futures which he did not secure in any quantity. Throughout the entire month print goods held firm with best prices ruling up to the turn of the year. Practically all of the Fall River mills were covered with cotton at from 10 to 12 cents, so that there will be some large profits made this year by these mills.

The action of the Fall River manufacturers in not taking advantage of their option to reduce wages in that city under the sliding scale agreement has done much toward preventing a general reduction of wages among cotton mills. There is no doubt but that a reduction would have been justifiable, but the Fall River manufacturers stated that for the third consecutive time they would waive their privilege of reducing wages because of the fact that a large majority of the mills in that city were well covered with low price cotton. There is no labor agitation at the moment, and the general reduction of working hours in Massachusetts to 56 hours per week has become operative without discussion or demands for increased wages to make up for the loss in hours as was the case when the legislature reduced the number of hours per week from 60 to 58.

There is no export trade to the South American countries just now on account of the disturbances in the Central American Republics. Many regular monthly shipments on contracts have been postponed; but now that peace appears imminent these shipments will doubtless be ordered re-established. There have been a few inquiries on drills for the China and Red Sea trade, and several large shipments of Pepperell drills were made last month on contracts just expiring.

Loom builders expect that 1910 business will be slightly under the past year because of a slight reaction; but that 1911 will be the banner year for machinery builders. Crompton & Knowles Loom Works are delivering a large number of looms each week for Southern mills, and report a number of inquiries from that section. Draper Co. is slightly late in some of its Southern deliveries because of shortage of metal, but this difficulty has been overcome and from now on it is expected that deliveries will be on schedule. The Stafford Co. has delivered several hundred looms this past month to Fall River mills. Kilburn, Lincoln & Co., Fall River, have booked more orders for looms since the first of October than for the previous three months according to one of their representatives.

The United States Bobbin & Shuttle Co. and the Emmons Loom Harness Co. report a splendid business with every prospect for a big year. Makers of other lines of textile mill supplies report very satisfactory business with excellent prospects for the year. The E. H. Jacobs Mfg. Co. has been running evenings in order to fill contracts for new equipments. It received contracts to equip the looms of the new mills and additions being made at New Bedford with "Very Best Lug Straps" which have recently been adopted by Crompton & Knowles Loom Works after three years of competitive testing. This company has equipped or contracted to equip 10,000 new looms with this lug strap since one year ago and 40,000 old looms.

Textile mill shares hold firm at best prices. There has been some selling of Amoskeag and other stocks because of no indications of increased or extra dividends, but every sale has been met with bids at advances over the previous sales. Cotton mill stocks are very firm and in excellent request, and it is entirely probable that there will be a market for an unlimited number of shares should present holders be dissatisfied or alarmed over 1909 earnings.

The year ahead will show many extra dividends and increased dividends, the writer believes. Among the mills that will probably increase their dividends or give substantial entras to their shareholders are Berkshire Cotton Mfg. Co., Bates Mfg. Co., Androscoggin Mills, Great Falls Mfg. Co., Boston Mfg. Co., Pacific Mills, Pierce Mills and several New Bedford mills including Acushnet Mills which will probably declare an extra of 50 per cent. It is freely predicted that Massachusetts Mills and Naumkeag Steam Cotton Co. will increase their dividend disbursements by at least 2 per cent. The Fall River mills will probably maintain regular dividends, and if cotton sells for a materially lower price next fall and the outlook is favorable for fabrics, there will be extra dividends declared by King Philip, Troy, Luther and Merchants. Probably Shove Mills will declare a stock dividend of 50 per cent. to make up for the years that dividends were passed. The outlook for textile mill stocks is entirely favorable, although as suggested there are several issues selling very much too high and when the past years earnings are published they will sell off sharply unless supported by insiders.

NEW MACHINERY AND TRADE NOTES

CLAYTON & BENTLEY'S AUTOMATIC THIN PLACE PREVENTER.

The object of this device, as its name indicates, is to prevent thin places from being made in cloth woven on automatic looms. The mechanism could, of course, be fitted to any loom, but it is unnecessary, except for the automatic loom which makes thin places in the cloth when the loom continues in operation in the absence of filling going into the cloth.

The device consists principally of a feeler finger resting

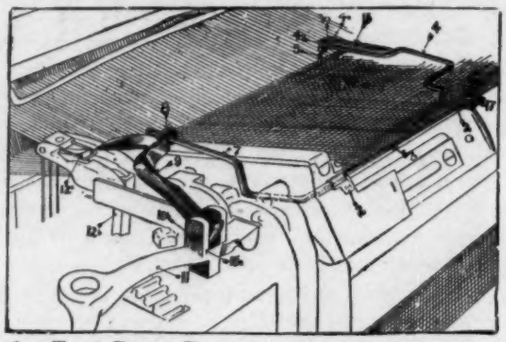


FIG. 1. THIN PLACE PREVENTER ATTACHED TO A LOOM.

on the cloth about two picks from the fell, and having suitable connections through levers, to operate the shipper handle, so that in case the filling becomes exhausted and the loom continues in operation the feeler finger will drop through the warp and cause a lever to come in the path of the reciprocating snake head, thus forcing said lever backward and through another lever operating the shipper handle to stop the loom. One of the important advantages in connection with this device is that it does not tear the cloth, since the detector point is pivoted and spring controlled, so that it yields to pressure from any source, when through any defect in or false operation of the loom the device is called into play.

The details of the mechanism are best shown by means of the accompanying illustration, in which 1 represents the breast beam of an automatic loom, having a bracket 2 in which is rotably mounted a detector rod 3. This rod 3 is bent at 4 into the shape above shown, and is provided at the end with a bell crank lever 4a, the lower end of which is provided with a detector finger 5. The bell crank lever 4a is pivotably secured to the arm 4 by means of a pivot pin 4b. The finger 5 is adapted to be supported on the fabric 6 in the loom at about two picks from the fell of the cloth.

The left hand end of the rod 3 is bent at right angles to have the portion 7 extend through and be loosely held by the arm 8 connected to a latch bar 9. This bar 9 is pivoted at 10b on a lug 10a which is mounted on a knock-off lever 11 of the loom. The bar 9 is adapted to fall into engagement with a notch 12a mounted on the snake head 12b, when not held up by the rod 7. When the bar 9 does fall into the path of the reciprocating snake head, it is pushed backwardly and actuates the shipper handle.

When the loom is operating properly, the finger 5 will be supported upon the fabric, always at about two picks from the fell of the cloth; but should the filling break and the shuttle not be properly replenished with yarn, thus making a thin place without the use of the device, the lack of filling under the feeler finger 5 causes it to drop, thereby causing the arm 7 through the connections shown to swing downwardly and allowing the bar 9 to fall into engagement with the notch 12a. The movement of the snakehead then causes the knock off lever 11 to operate the shipper handle to stop the loom.

When the filling has been threaded into the shuttle properly, the loom may be started by simply raising the arm 4 while the shipper handle is operated.

The finger 5 is held normally at right angles to the arm 4 by means of a coil spring 15, one end of which is secured to the free end of the bell crank lever 4a, while the opposite end of said spring is secured to the arm 4. The downward movement of the bell crank lever 4a is limited by means of a stop pin 16, which is carried by the bell crank lever and extended over the arm.

It will therefore be seen that by pivoting the finger 5 upon the arm 4, there is no danger of the fabric becoming torn when the finger at 5 drops through the warp, because the spring 15 will allow the finger 5 to swing out of engagement with the fabric when subjected to pressure. The protection plate 17 prevents the arm 4 from being raised into the line of travel of the shuttle guide and reed cap.

Clayton & Bentley Co., Atlanta, Ga., manufacturers of this automatic thin place preventer, state that 35,000 are in use in 72 mills.

THE MORSE TURRET CYCLONE DUST COLLECTOR.

This apparatus is adapted for handling fine dust, fine lint, textile cuttings, etc., and is very serviceable in separating and saving the dust from rag cleaners, carbonizers, and textile machines creating a fine fibrous dust. It collects the finely-powered float material without loss of product and maintains a uniform, positive suction under any atmospheric conditions, practically without any back pressure on the fan.

The "Turret Cyclone" has for its base a regular "1905" cyclone with a revolving turret placed above it as shown in Fig 1. The deck of the turret is of wood, and from

FIG. 1.

FIG. 2.

its edge hangs an endless circular curtain fastened at the top and hanging free, the lower edge traveling between inner and outer guard plates for guiding the skirt circularly and preventing the free passage of air under the skirt. The curtain is constantly in motion, making 18 revolutions per hour, the deck of turret being revolved by the action of a worm gear on a shaft placed just above the top of the cyclone, and said worm being driven by a pulley requiring one-inch belt.

On one side of the turret is a segregated cleaning chamber, shown in Fig. 2, at the front, through which the curtain revolves and the portion within the space is cleaned by the whipping with rattan strips, clearly shown in the illustration, as it slowly passes across the chamber. The whipping action is obtained by a cam on the end of a shaft operating in connection with a lever and coil spring. The tension of the latter governs the striking force of whippers, and can be instantly changed by the operator as desired. The curtain material is a very coarse fibrous jute, one or more thicknesses being used according to the character and condition of the dust to be handled, the one shown in the illustration being a double or two layer curtain. By raising the curtain as shown in Fig. 2 instant and full access is given to the interior and working parts of the turret top.

The cyclone collects the great bulk of material in the air current, the same being discharged at the base of the cone. All of the air and the leak of the cyclone passes into the turret whence the air filters through the curtain at a very low velocity, while all of the fine dust is retained and discharged by itself as collected.

The illustrations show the "Turret Cyclone" on four standards for convenience in placing the same on the floor, but it may be suspended from the ceiling, if desired.

The Knickberbocker Co., Jackson, Mich., sole manufacturers will ship one of these dust collectors to any concern on 60 days trial, with the privilege of returning if it does not prove satisfactory.

AN IMPROVED REEL.

The Lowell Machine Shop, Lowell, Mass., has recently placed a new pattern of yarn reel on the market. The accompanying illustrations, Figs. 1 and 2 show the new reel with the swifts respectively extended and collapsed.

The distinguished features of this reel are its substantial construction, ease of operation, and the particularly novel doffing arrangement. The reel is built according to different specifications to suit any kind of material, from the finest yarns to high plys of seine twine and mop yarns. The long reel shaft is made of extra heavy tubular steel and shows no deflection under severe working conditions. Four sets of spiders are located on this shaft, said spiders being of a double yoke pattern, and carrying stands for supporting the hardwood slats of the swifts.

The swifts are retained in an extended position as shown in Fig. 1 by means of an arrangement located at the second

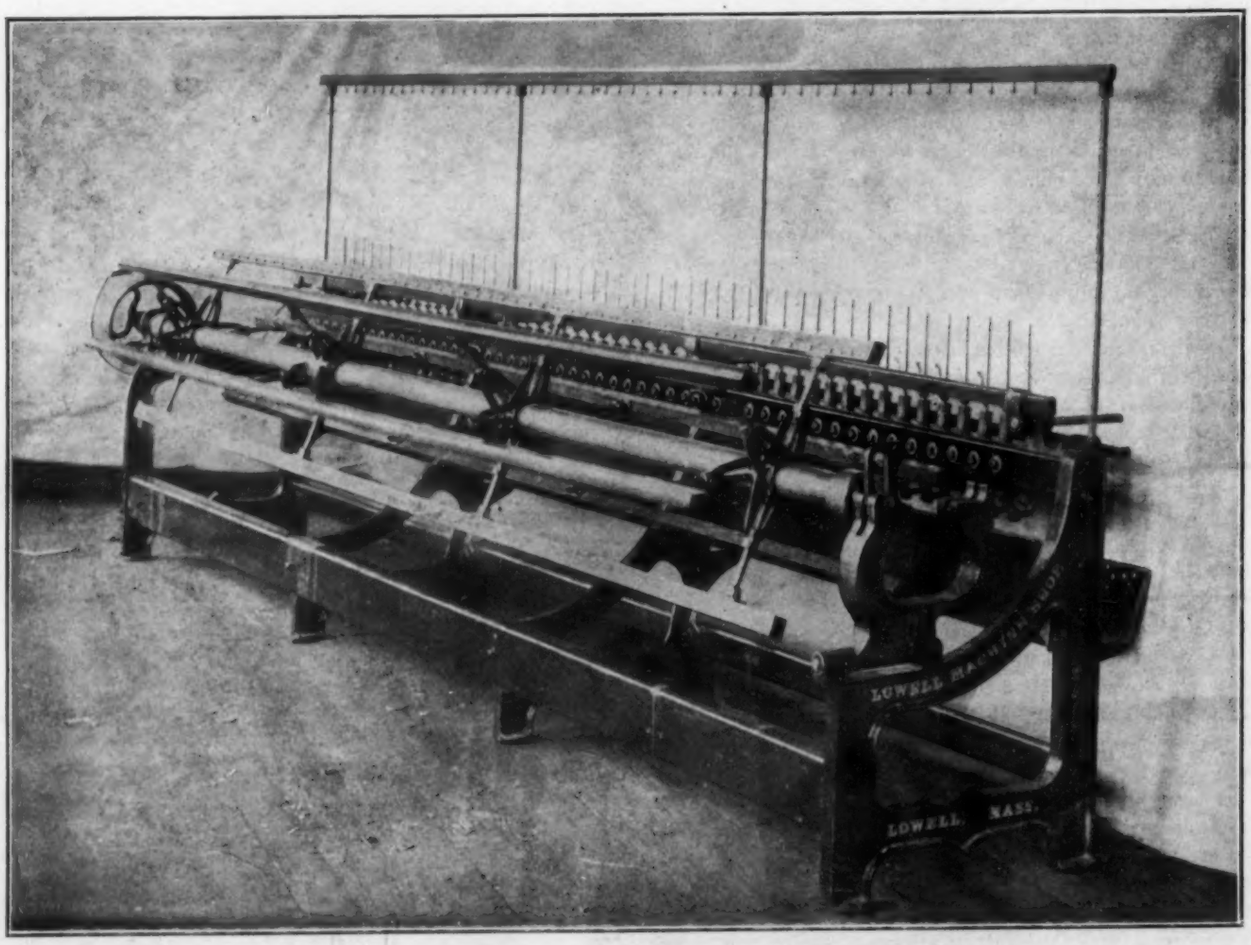


FIG. 1. VIEW OF REEL, SHOWING SWIFTS EXTENDED.

set of spiders from the pulley end of the frame, consisting of a heavy spring pin inserted in two faced discs; these revolve on each other when collapsing the swifts preparatory to doffing. By this method the skeins of yarn are very easily removed from the reel. When the reel is in operation the swifts are held rigidly in position. By means of the adjustable spiders, the swifts may be set to reel 54, 72 or 90-inch skeins.

The pulley end of the reel shaft is located in a universal bearing, which allows a movement of the shaft from the opposite or yoke end of the frame. This latter end is the doffing end of the machine, the doffing arrangement consisting of a yoke casting, with the open end at the top, and arranged with slats for holding a link which forms the bearing for the reel shaft.

This link is separate from the yoke and contains a slot in which the reel shaft may slide when properly operated.

When doffing the frame, after the swifts have been collapsed, the skeins are drawn to the yoke end of the reel and the yarn on the rear side of the reel is drawn into the yoke. Then a slight pressure is given to the upturned link holding the shaft, placing said link in the slot in the opposite end of the yoke, and thus transferring the shaft to the rear side, leaving the skeins free to be lifted out of the yoke. To reset the machine for reeling, the shaft is returned to its original position by transferring the link to the opposite slot.

The operation is so easy that the smallest operative is able to perform the work. All supports to shafts when doffing are eliminated; also any wrenching of a quadrant is not necessary.

There is no chance of oil getting on skeins, and the entire operation is simple and effective. The frame may be provided with a clock to stop the reel when a certain yardage has been reeled.

The traverse motion, shown in the illustrations just in front of the spindles, is variable and any degree of cross winding is obtained by its adjustment and change gears. The spindles are of the single rail type, and are provided with adjustable friction by which the tension on the skeins can be regulated.

The yarn from warp wound bobbins is usually wound direct by revolving the spindle, but it may be drawn over the head of the bobbin as in the case of filling wound bobbins, the yarn passing through the guides of the overhead guide rail. The bobbin boxes are made of sheet steel, heavily ribbed on the edges and provided with cast ends. This reel has met with complete success and only a few doffs are necessary to demonstrate to the operator the improvements it bears.

The standard size of this machine is 50 spindles, 3-inch gauge, which when so built is 14 feet 7 inches long, and with 54-inch swifts is 3 feet 9 inches wide. This length is usually maintained for all gauges, except when limited space demands machines in shorter lengths.

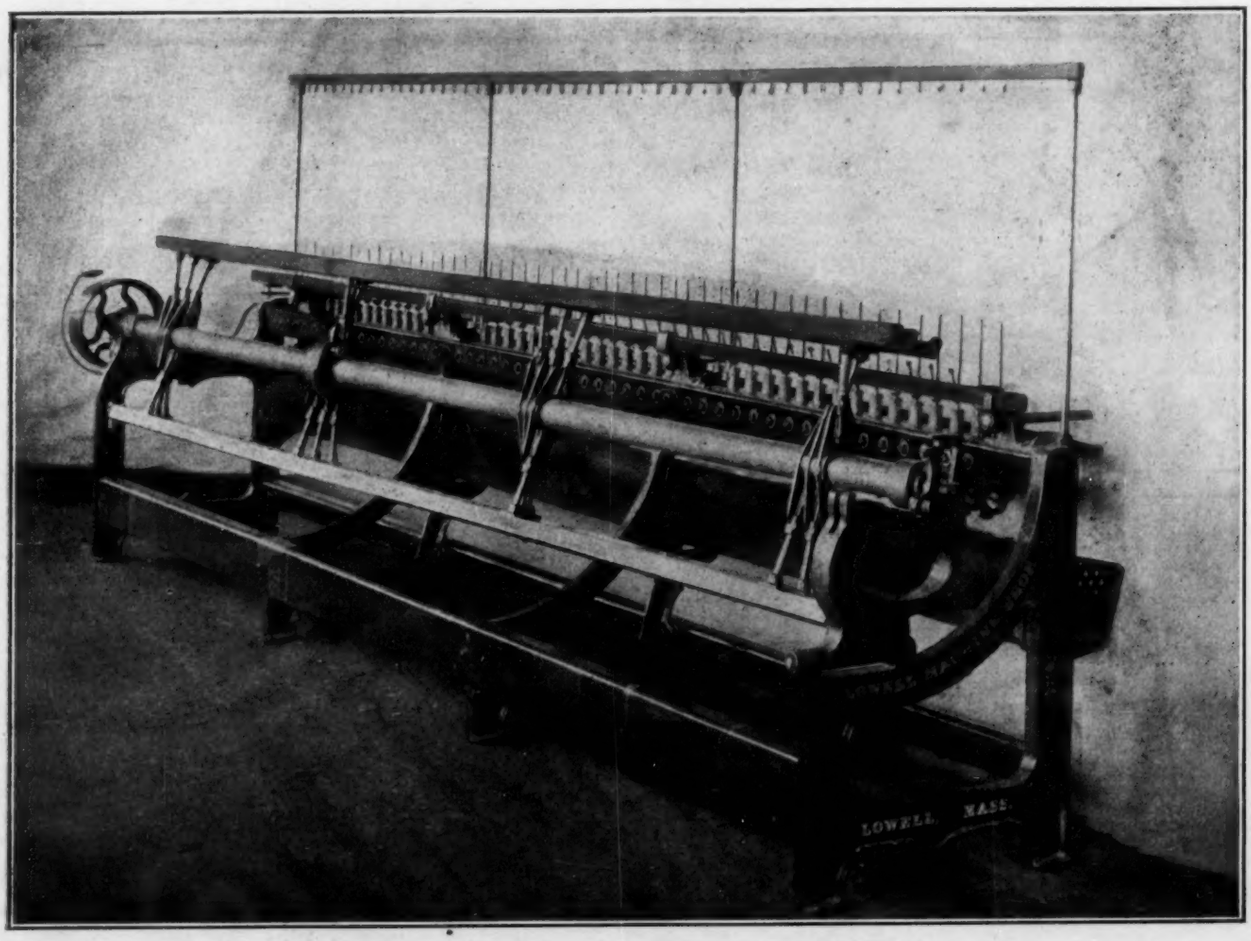


FIG. 2. VIEW OF REEL, SHOWING SWIFTS COLLAPSED.

The usual sizes and number of spindles are as follows:

No. of spindles.	Gauge.
45	3¼ inches.
42	3½ inches.
39	3¾ inches.
37	4 inches.
34	4¼ inches.
32	4½ inches.

In special cases this machine is built with as low as 12 spindles and arranged for an unrolling supply from spools as large as 8x10 inches. The usual pulley sizes are 12x12 inches—125 to 150 R. P. M., belted from above or below. The frame proper is made heavy for either fine or coarse yarns, and the working parts are made as heavy as the duty demands.

NEW PLANT OF THE FRANK MOSSBERG CO.

The new home of the Frank Mossberg, Co., Attleboro, Mass., has just been completed, and contains 50,000 square feet of floor space. This is the third time that this company has had to seek larger quarters to take care of its increased business. The chief products of the factory are wrenches, steel reels, beams and spools, sheet metal specialties, special tools and machinery.

The size of the main building is 290x60 ft., two stories high. The presses and other heavy machinery are located on the first floor. The second floor is used for light manufacturing, tool making and special work, and also for the office of the company.

The smaller building is 150x60 ft. and contains the power plant, hardening, brazing and forging rooms, furnaces, electro-plating plant, and apparatus for polishing and grinding. Electric power is used, the larger machines being driven by separate motors varying from 2½ to 25 H. P.

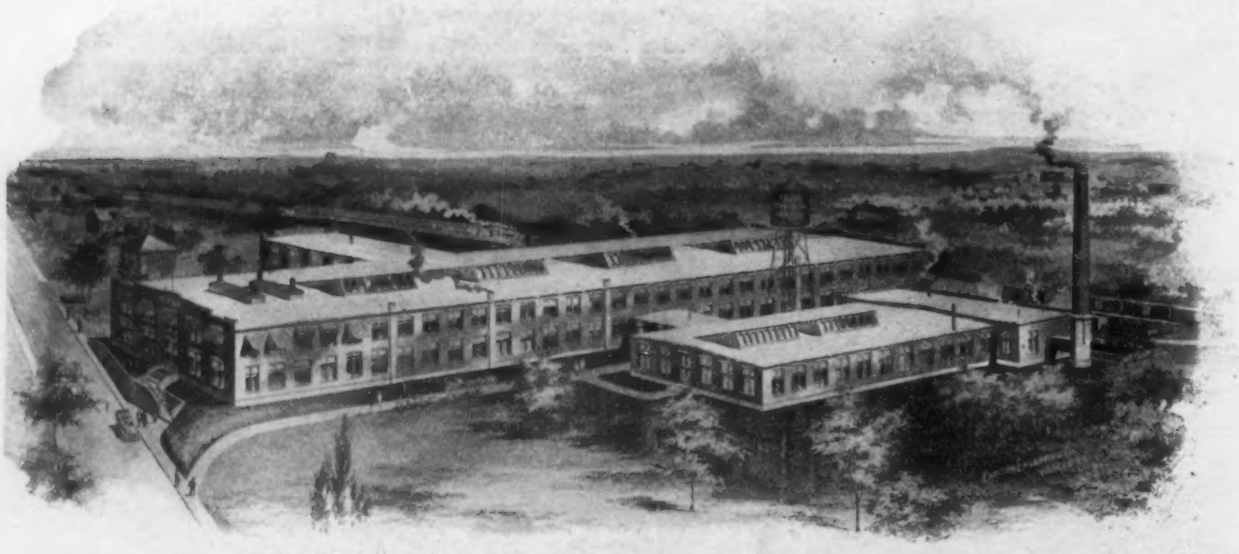
It is interesting to know that this concern turns out 1,000,000 wrenches annually, besides the other specialties mentioned above. The company reports a growing demand for its steel reels, beams and spools, which find extensive use in the textile industry in connection with cotton and silk looms, webbing looms, dyeing and bleaching. Wire and wire cloth manufacturers also use them for handling their products.

The advantages of pressed steel beams with steel barrels for warps are obvious to all textile manufacturers. As compared with wooden beams and beams with cast iron heads, there are many points wherein the pressed steel beams are worthy of consideration. The construction of the pressed steel beam is such that while the weight is about 20 per cent. less than that of the wood or cast iron beams, the strength is far greater, so that practically indestructibility has been attained.

The best open hearth steel is used for both heads and barrels, and the beam is held firmly together by bolts, the bolt ends being carefully riveted over to prevent any loosening of the heads from the barrels. A smooth surface is always presented to the warp and the most delicate warps will not be injured. A special slot is provided for the purpose of attaching the end of the warp when commencing to wind onto the beams.

The heads and barrels can not crack, warp, splinter or accumulate dirt or foreign substances; neither do the heads chip or break when roughly handled. This fact, in itself, is of great importance, as the pressed steel beam thus eliminates all waste due to cutting or breaking of warp threads from this cause. It is also impossible for the contents of a beam to become a total loss through the breaking of one or both heads, as no breakage of the pressed steel heads can occur. Any desired finish can be applied to these beams. Pressed steel beams can be made to fit any existing conditions of loom construction.

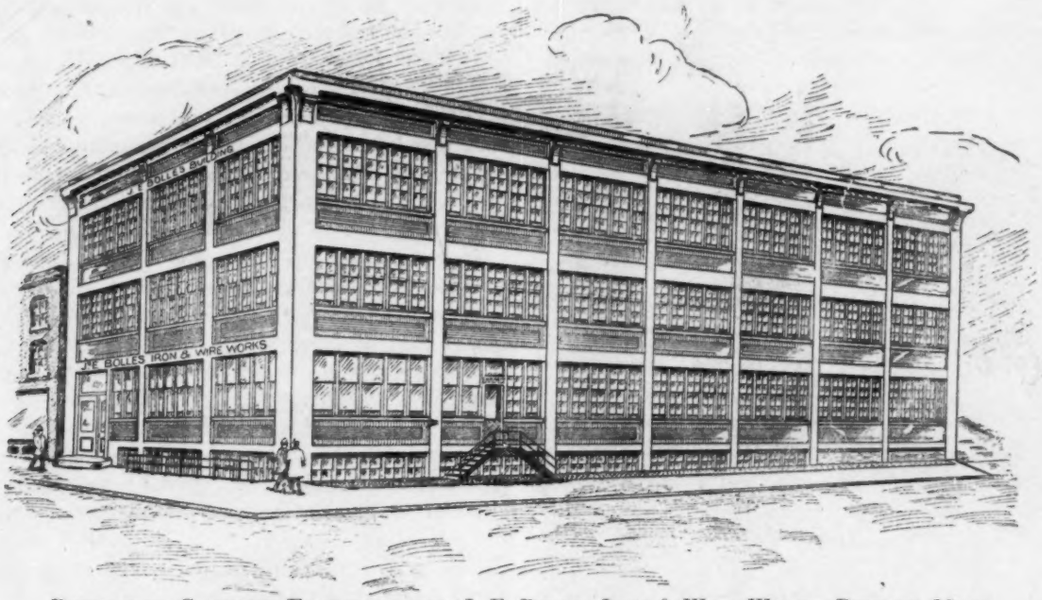
CLIFTON CORLEY AND W. E. WILLIAMS, Tennille, Ga., have invented an automatic tension regulating thread guide for winders, which is described in this issue, and are preparing to put the device on the market at once. They will give any inquiries prompt attention.



VIEW OF THE NEW PLANT OF THE FRANK MOSSBERG CO., ATTLEBORO, MASS.

NEW PLANT OF THE J. E. BOLLES IRON AND WIRE WORKS.

A new and modern fireproof factory building of reinforced concrete has recently been completed at the corner of Porter and Fourth streets, Detroit, Mich., for the J. E. Bolles Iron and Wire Works, giving them ample space for more than double their former capacity.



REINFORCED CONCRETE FACTORY OF THE J. E. BOLLES IRON & WIRE WORKS, DETROIT, MICH.

The main building shown in the accompanying illustration is 60x130 ft., three stories high and basement, with a three-story wing, 63x45 ft. The total floor space is more than 40,000 square feet. Malcomson & Higginbotham, Detroit, were the architects, and Otto Misch general contractor.

A feature of the opening of the new building was the finding by Mr. Bolles that his private office had been fitted up the evening before with mahogany furniture and a handsome rug. This was a token of esteem from all of his employees, several of whom have been with him continuously for over 25 years. The success of the business so conclusively demonstrated in the opening of this splendid factory, is due principally to the energy, enterprise and courtesy of Mr. Bolles who has been ably aided, however, by the body of faithful assistants that he has gathered around him.

The J. E. Bolles Iron and Wire Works publish a beautiful catalogue, containing illustrations and descriptions of their complete lines, which comprise plain and ornamental metal work of every description, including bank and office fixtures, elevator enclosures and cars, stairs and balcony work, mausoleums, memorial tablets, iron doors, iron fences, fire escapes, lawn furniture, all classes of plain and decorative work, for exterior and interior use in brass, bronze, iron and steel in all the popular finishes, as well as several finishes exclusively their own; wire work, such as bank cages, office railings, partitions for cotton mills, tool rooms, etc., asylum guards and cages, window guards, wire signs, light and heavy wire and iron fencing, etc. The fire escapes on all the Detroit public schools which include some thirty-five or more buildings, have been erected by this firm. The ornamental iron and stair work for the Newcomb-Endicott new building and the eight-story Dodge building are among their present Detroit contracts. Their shipments extend to all parts of the United States and several foreign countries. A copy of their illustrated catalogue may be had by those interested upon application to the home office.

NEW PUBLICATIONS.

THE MECHANICS' AND MATERIALMEN'S LIEN LAWS OF SOUTHEASTERN STATES, by Henry A. Alexander, Attorney at Law, Atlanta, Ga.

The author, in preparing and compiling this accurate information relating to the mechanics' and materialmen's lien laws in Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, and Virginia, had in mind the unprecedented building activity and industrial development in these states, and recognized the importance of correct knowledge in convenient form to owners of real estate, to furnishers of labor and material, and to those lending money upon the security of real estate.

The book is arranged in sections, and treats each state separately, giving the law of each state, embracing its statutes and the decisions construing them, and having a separate table of contents and index relating exclusively to that state.

The data pertaining to each state is divided into seven parts, with a simple title for each section, which thus affords a convenient means of reference for the general business man.

The work is of especial value to all textile manufacturers who are concerned in the financial affairs of their mills and we take pleasure in recommending it most highly to our readers. The volume contains 776 pages, and orders will be filled at this office upon receipt of the price, $6.00.

Electricity, powerful as it is, can not get along without cotton. Millions of miles of copper wire annually owe the perfection of their insulation to cotton yarn or tape of cotton cloth.

JOHNSON & WALKER, Providence, R. I., dealers in cotton yarns of every description, make a specialty of marketing the products of Southern mills. This firm started business about a year ago in a small office in the Banigan Bldg., but their business has grown to such an extent as to necessitate larger quarters. The firm has accordingly secured proper accommodations in the National Exchange Bank Bldg., 27 Exchange St., Providence, R. I., where they can handle the increased business. Although this concern handles almost entirely the products of Southern spinners, yet

J. T. WALKER.

WM. C. JOHNSON.

it has the facilities for furnishing yarns of all descriptions for any purpose of manufacture.

Both members of the firm are well adapted for business in which they are engaged; Mr. Walker was for a number of years connected with one of the large commission houses in Providence, and devoted a great deal of time to the study of the business. Mr. Johnson, who is a son-in-law of Chas. F. Eddy, of the late firm Eddy & Street, yarn dealers, has made a special study of textile materials, and yarns in particular.

The new offices of the firm are conveniently located in the business section, and the members are always pleased to receive calls from those interested in textile work, and especially from Southerners who visit the city.

THE J. A. GOWDEY REED & HARNESS MFG. CO., Providence, R. I. have constructed a new factory at 1226 North Main Street, for the manufacture of loom reeds. The building is a two-story brick structure 79 x 45 ft., and has all modern improvements in mill construction. Electricity will be used for power throughout. The J. A. Gowdey Reed & Harness Mfg. Co., one of Providence's important and widely-known industries, having been established since 1834, have occupied their present plant for the past 48 years.

Their product is confined entirely to loom reeds of which they manufacture all kinds, for cotton, woolen, silk, linen and wire weaving. They are the only manufacturers in this country making the highly tempered steel reeds for weaving fine Fourdrinier wire cloth. They also have a special department for the manufacture of soldered reeds of all kinds for silk and ribbon weaving, which is in charge of a thorough and competent metal reed maker. The company employs only experienced reed makers, some of whom have been with the Gowdey Co. for over 40 years.

In their new plant they will have facilities for filling large orders on short notice, as they will carry a large stock of prepared material. The business is controlled entirely by James Wilson of Pawtucket, R. I., who is sole owner and acts in capacity of president and treasurer. J. Arthur Wilson is assistant treasurer. James Wilson is a well-known and enterprising business man, and since his acquiring control of the J. A. Gowdey Reed & Harness Mfg. Co. in 1900, he has made it a point to keep the shop in a position to meet all demands, to satisfy the customers, and to give prompt and efficient service so that the company shall keep up its reputation which it has made years ago.

THIO-DEVELOPER AND BRILLIANTONE are two articles for which much is claimed for after-treating sulphur blacks. When "Thio-developer" is used in the first wash water, it will develop the black from a shabby empty shade to a full rich intense black, and by regulating the temperature of the bath any shade of black can be produced; the hotter the bath the better the shade. "Brilliantone" finishes the work begun by "Thio-developer," giving luster, finish and a good handle to the goods, and acts similarly on oxidized and developed blacks and all colors. This new method costs about thirty-five cents to after-treat 100 pounds of goods, and as from two to four per cent. less dye stuff can be used, it is cheaper than the ordinary process. These articles are manufactured by Scholler Bros. Co., 3301 Amber St., Philadelphia, Pa., and they would be pleased to send samples and quotations upon request.

DRAPER CO., Hopedale, Mass., is sending out copies of its new 1910 calendar which is a most artistic production. A colored reproduction of its L. Model Loom finds space at the top of the calendar, and a view of the Draper Co., works reproduced from one of the new auto-chrome or direct color photographs, making a very handsome office calendar. The pads are made for memorandum use which the company has been distributing for several years back, this being a form that has proved very useful to the parties in the mills.

AMERICAN NO-SLIP CEMENT CO., 60 State St., Boston, Mass., manufactures Palium which is a cement pulley covering used to prevent the loss and irregularity caused by the slipping of belts in the transmission of power. It may be used on friction drives, main driving pulleys, clutches, and on machines of every description. Palium can be applied to wooden, paper, iron or steel pulleys, and the surface will not glaze. It eliminates the slipping of belts without the use of belt dressing. Palium when hardened has a thickness 1-32 to 1-64 of an inch, and requires but twelve hours to harden under ordinary conditions. The company has issued a four-leaf pamphlet setting forth the advantages of Palium and comparing it with belt dressings, which should prove of interest to our readers. A copy of the pamphlet may be had upon application to the home office. Agents are wanted throughout the country to whom liberal terms will be made.

CHARLES H. BRIDOUX, 312 N. May St., Chicago, Ill., has issued a pamphlet describing his well-known American Sewing Machines. The No. 7 overstitch machine makes an invisible flat elastic lock stitch with two threads, welting the seams for the wrists, and is used for knit gloves, sweaters, hosiery, etc. The seams of the garment are finished and completed in one operation, and no trimmer is required. Several kinds of seams may be made, such as selvage edge, overedge, blind stitch, raw edge, welting seam, and hem seam. The No. 7-B machine is for sweaters; it makes the entire garment complete, sewing in the sleeves with loops on, making a double bottom with welted seams. No. 7-A machine is especially for knit gloves, hosiery and other

knit garments, made of wool, cotton or silk. A copy of the pamphlet may be had by addressing the maker.

GLOBE MACHINE & FOUNDRY CO., Frankford, Philadelphia, builders of the Denn Warping Machinery have issued a handsome catalog describing their various machines with illustrations, as well as photographs of the different parts. Among the different machines made, may be mentioned the Denn Linking and Warping machine (single and double linking head): Denn warper with four-ball attachment; Denn Beaming machine; Denn Section Beam warper; the improved model Ball Warper; Denn Balling machine; and the Long Chain Beaming machine. The builders will supply catalog upon request.

THE HYDRAULIC PRESS MFG. CO., Mount Gilead, Ohio, manufacturer of hydraulic presses and pumps, especially for cloth finishing purposes, and for baling cloth, bags, etc., has issued a very instructive pamphlet on "London Shrinking" in which is described the cold water process adapted to the requirements of woolen mills, and cloth spongers. This process is thoroughly described in the text and with illustrations. With an hydraulic press it is possible to note to the fraction of a pound just how much pressure is being applied, which information is very necessary when finishing fine fabrics. The pamphlet has had a wide distribution, and any one interested may obtain a copy by addressing the home office.

JOSEPH DIXON CRUCIBLE CO., Jersey City, N. J., in the December issue of "Graphite" gives some items of interest to engineers and others and will be read with great interest. A great deal of amusing reading matter is interspersed throughout the pages which naturally presents the subject of Dixon Graphite to the reader when he is in a happy mood.

MAYO KNITTING MACHINE & NEEDLE CO., Franklin, N. H. is distributing one of the handsomest calendars of the year. It is the reproduction of the original painting "End of an Autumn Day," by Edward Lamasure.

WESTINGHOUSE ELECTRIC & MFG. CO., Pittsburg, Pa., is distributing a vest pocket diary for 1910, similar in character to those issued for the past six years. Much new matter has been added to this year's edition. The memorandum pages are very handy for cotton mill men to keep a record of spot cotton prices for every working day in the year.

RECOVERY OF MERCERIZING CAUSTIC.

ZAREMBA CO., 1240 Monadnock Block, Chicago, Ill.; manufactures the Zaremba Patent Evaporator for the concentration of the wash waters and the recovery of the caustic soda used in the mercerizing process. This evaporator is shown in the accompanying illustration; it is the outgrowth of long experience, and has been thoroughly tested by practical work. It is claimed that it combines the structural advantages embodied in the cylindrical shell of the old style vertical-tube evaporator with the great heat transmission afforded by the horizontal-tube machine; at the same time it is entirely free from the complex piping and attachments required by the film-type apparatus.

The Zaremba evaporator belongs to what is known as the submerged-tube type, in which the tubes of the heating surface are submerged in the caustic liquor, the steam being carried inside of the tubes. The heating surface is made up of seamless steel tubing carried in a cylindrical shell of steel. The tubes are held in place by elastic gaskets and packing glands, making it possible to easily remove the tubes at any time. The vapor space above the boiling liquor is given ample height preventing loss of caustic by entrainment; as a further safeguard in this direction, internal catch-alls are provided. The use of large peep-holes in the machine, together with internal electric lights, renders the interior of the evaporator perfectly visible, and gives the operator knowledge of its action at any time. The builders state that improper operation can be due only to carelessness.

These machines are built for any capacity, running from 100 to 10,000 gallons per hour. To secure steam economy they are furnished in any desired number of multiples. The illustration shows a quadruple effect which will produce an evaporation of 4 pounds of water per pound of steam where the liquor is fed hot. Where exhaust steam is available the apparatus affords an ideal opportunity for its efficient use, a non-condensing engine working in conjunction

ZAREMBA EVAPORATOR, QUADRUPLE EFFECT.

with a vacuum evaporator being far more efficient than a turbine installation. The steam, after condensation, is returned to the boiler as feed water at 212 degrees.

The cost of evaporation will depend entirely upon the density of the feed liquor and the nature of the steam supply. The labor cost is very low and the maintenance charges are practically nothing, due to the great simplicity of the machine. In some mercerizing mills where evaporators are used, it is found necessary to make several successive runs of liquor in order to bring it to the proper density. The Zaremba evaporator performs its work at one passage of the liquor. By the use of a density tester the discharge is effected at the right point. To secure the cost of soda recovery, mercerizers are requested to send data as follows to the Zaremba Co.: Initial density of feed liquor, amount of liquor daily; and amount of exhaust steam available.

FRED S. HINDS, Boston, Mass., consulting engineer, was for 18 years previous to 1900, with Lockwood Greene & Co. Mr. Hind's present offices are at 19 Milk St.

FREDERIC H. KEYES, formerly general manager of the Robb-Mumford Boiler Co., has associated himself with Timothy W. Sprague, Henry Docker Jackson, and others, to carry on a general consulting engineering business under the name of Timothy W. Sprague, Frederic H. Keyes, Henry D. Jackson and associates, 88 Broad Street, Boston, Mass. They propose to make complete reports and investigations, and furnish designs and supervision for all sorts of power plants for lighting, railway or industrial purposes; also mining reports, investigations and power plants. This combination takes place on January 1, 1910.

FARBENFABRIKEN OF ELBERFELD CO., New York, has issued some very handsome color sheets showing samples of different dyes used with directions for dyeing. Among the different dyes for cotton yarns and fabrics may be mentioned brilliant fast blue B, 2 G, 4 G, Toluylene yellow G, Chloramine yellow R C, Benzo Brown 3 G C, Algole yellow 3 G paste, R paste, Algole Orange R paste, Algole Scarlet G paste, Algole Red B patse, 5 G paste, Algole Blue 3 G paste, Algole Green B paste, Leucole Dark Green B paste, and Leucole Brown paste.

Other sheets show cotton yarns dyed with Katigen Black 2 B extra conc., and Katigen Deep Black B G, Algole Pink R paste, Benzo Fast Yellow 4 G L extra, Benzo New Blue 5 B, and 2 B, and Pluto Brown V extra.

Other colors used for printing on cotton shown on different sheets are Brilliant Chrome Scarlet B D pdr., Gallo Fast Black Paste, Para Brown V extra, and Para Green 2 B L.

Another set of sheets shows samples of worsted yarn and cloth dyed with Anthra Cyanine 3 G L, Azo Fuchsine 4 G extra, Diamond Red 3 G, and Diamond Red 5 B, Naphtylamine Black 5 G L, and 4 B L, Sulphon Acid Brown 2 R, and 4 R.

CASSELLA COLOR CO., has issued two folders 3174 and 3175, being fashionable shades 1909 on linen and cotton goods, and cotton yarns respectively. The shades for linen and cotton goods are obtained with the diamine colors, the shades being shown by small samples and giving the percentages that are required to produce these shades. The cotton yarns are dyed with immedial colors, the different samples with their respective percentages of colors being also given.

H. A. METZ & CO., NEW YORK CITY, have issued a very useful booklet on "Victoria" sizing, the object of the pamphlet being to describe in brief the different compounds manufactured by this company, and used in preparing and finishing cotton and other textile fabrics. It is stated that in the majority of cases the regular brand of "Victoria" sizes and finishes will answer all requirements of the trade but the company also make a special preparation to modify any of their products to suit special conditions when desired. This handy little booklet may be obtained from the makers upon application.

GRINNELL WILLIS & CO., New York City, commission merchants, have made the following advances: Wamsutta 4/4 percale advanced ½ cent to 13 cents; Williamsville A-1, 4/4 bleached advanced ½ cent to 11 cents.

THE AMERICAN ENGINE CO., Bound Brook, N. J., has received an order for two 500 horse-power angle compound engines to be used for running centrifugal pumps of the Interboro Rapid Transit Co.'s power plants, in New York City. This order is an evidence of the complete satisfaction angle compound high speed engines are giving, and this order is the result in the previous performance of similar engines going out earlier in the season.

WESTERN ELECTRIC CO. This company is now represented in Cincinnati by Guy H. Gibbs who was with the Westinghouse Electric & Mfg. Co., for the past eight years, four of which were with the company's Cincinnati offices.

THE OTIS ELEVATOR CO., New York City. The October issue of the "Indicator" on its front page gives a splendid illustration of its attractive exhibit at the Electrical Show held at Madison Square Garden, October 11 to 12 inclusive. In order to show the mechanical workings at parts of the building, a push-button elevator, in a steel tower 30 feet high was erected. The method of announcing at which floor the elevator would stop was made by means of an electric sign showing at all sides of the tower, which read "Cars Stop Here Automatically," which lighted up as soon as the car was put in operation. Several other articles of interest in the issue are "Selfridge Store," "A Government Wireless Station proposed for Washington, D. C.," "Electric Dumb Waiters," etc. There is also an article on "Type H. & K. Electric Machines," with illustrations.

DOCKHAM'S TEXTILE DIRECTORY, twenty-second edition, has just been issued. The complete directory contains 642 pages measuring 7x10 inches. The work contains an alphabetical list of all textile mills, print works, bleacheries, dye works and finishing plants in the United States and Canada; a list of all the mills, giving names of the officers, equipment, etc., by states; a similar list is given for bleacheries; a complete list of the cotton dealers in the United States, Canada, Liverpool, Bremen and Havre is given; lists of commission merchants, importers of dry goods, dry goods dealers, etc., are also found; and a mortuary record from 1906 to 1909 of prominent textile mill men.

JOHN A. ROEBLING SONS CO. and the General Electric Co. were awarded grand prizes (highest award) for insulated wires and cables by the Alaska-Yukon-Pacific Exposition.

THE GENERAL ELECTRIC CO. has received grand prizes (highest award) at the Alaska-Yukon-Pacific Exposition in each class of electrical apparatus in which an exhibit was made by the company. G. E. Apparatus was ranked first in the following divisions: Apparatus for cooking by electricity; apparatus for heating by electricity; automatic motor starters; arc lamps; bonds; cabinets; circuit breakers; cutouts; fans; indicating instruments; integrating instruments; insulated wires; insulated cables; incandescent lamps; mine locomotives; motor generators; motors for direct current; motors for alternating current; recording instruments; rectifiers (mercury arc); rheostats; sockets, switches; transformers; and wiring devices.

The company reports very gratifying sales of Tentalum lamps. The sales of this lamp are more than double what they were a year ago, and the lamp appears to be sharing with the demand for high efficiency lamps created by the introduction of Tungsten lamps. The Tantalum lamp, as at present supplied, is giving most excellent life service. Contrary to general belief, these lamps will give good commercial life on alternating current of 60 cycles or less. Their life on this frequency will average well above 600 hours. An interesting Tantalum lamp order lately received called for 1,900 lamps for the U. S. war vessels attending the Hudson-Fulton Celebration in New York.